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ABSTRACT

This monograph reports on the establishment of a videotape data bank designed to record activities in physical education classes for analyzing and describing teacher and student behaviors. The process of obtaining approximately 80 tapes of elementary and high schools classes and of developing procedures for efficiently describing what was contained on the videotapes is described. Introductory tables provide information on the videotaped classes by grade and sex and on the distribution of sport activities observed. Five descriptive studies are presented, each focusing on the topic selected for observation: student behavior; teacher behavior; teacher student interaction; augmented feedback; and pedagogical moves. Each chapter is prefaced with a discussion of the develoment of the descriptive system used in the study, followed by a narrative description of classroom events. Charts, tables, and graphs are used to illuminate data gathered from observation. The final chapter presents a synthesis of observations, focusing on three major themes which emerged from the study: (1) the pace at which things happen in the gymnasium; (2) the general model of teaching prevalent among the teachers; and (3) patterns of variability in the behavior of both teachers and students. (JD)

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WHAT'S GOING ON IN GYM:

Descriptive Studies of Physical Education Classes

Edited by

William G. Anderson
Gary T. Barrette

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MONOGRAPH 1 MOTOR SKILLS: THEORY INTO PRACTICE

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MONOGRAPH 1
MOTOR SKILLS: THEORY INTO PRACTICE

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Chapter One

Introduction

WILLIAM G. ANDERSON

A few years ago I joined with a group of physical educators who were intent on finding out more about what was going on in physical education classes. Convinced that our current sources of knowledge were inadequate, we were determined to extend that knowledge beyond our own subjective impressions, beyond the limited number of settings we normally encountered, and beyond the idealized program descriptions we found in the literature. So we organized the Videotape Data Bank Project; and spent the next several years collecting videotapes of physical education classes and systematically analyzing the tapes to determine what happened in those classes.

We know a lot more now than we knew then about the day to day realities of physical education. This newly acquired knowledge has been immensely useful to us in our work as teachers and teacher educators. This monograph is an attempt to share some of that new knowledge with interested professionals in the hope that you find it as interesting and useful as we did.

The major portion of this monograph (chapters two through six) presents descriptions of the events we observed in the videotaped classes — i.e., our version of what's going on in physical education classes. To properly interpret those descriptions, however, one must be familiar with the procedures used in the Videotape Data Bank Project.

The Videotape Data Bank Project

The Videotape Data Bank Project was initiated in the Fall of 1971 by a group of graduate students[1] enrolled at Teachers College, Columbia University and myself. Our intent was to collect a substantial number of videotapes of physical education classes to be used as raw data for our individual and joint research efforts. We were interested in doing *descriptive-analytic* research — which means we wanted to obtain an objective and detailed description of in-class events as they occurred in their natural settings, and then analyze relationships among these events.

This type of research had flourished in other areas of education for several years. (See, for instance, reviews of research in this area by Dunkin & Biddle, 1974; Rosenshine & Furst, 1973; and Amidon &

Hough, 1967.) Such studies had yielded valuable descriptions of classroom events. We were interested in gathering equally valuable descriptions of events in gymnasiums.

In part we were motivated by the conviction that the essential character of physical education is not to be found in curriculum guides, textbook accounts, journal articles, or other written program descriptions, but in the day-to-day realities of physical education classes. Our hope was to be able to grasp a meaningful portion of that reality, to understand it better, and to share the results with interested professionals.

The Project consisted of several stages involving the collection of videotapes, the development of descriptive systems, and the use of those systems to explain what happened in the videotaped classes. The following sections summarize these stages of the Project.

Selecting the Sample of Classes

Our first task was to select an adequate sample of physical education classes for videotaping. We decided to use a sampling procedure that would ensure a reasonable amount of diversity in the educational settings chosen, and, to the extent possible, would yield a reasonably representative sample of what was going on in programs in our area.

We decided to limit our efforts to obtaining approximately 80 tapes divided among three major program areas: elementary school programs, girls' senior high school programs, and boys' senior high school programs. Coeducational high school classes were included when offered at the selected school on the day of visitation. Limitations in time and resources excluded the possibility of obtaining an adequate sample of junior high school classes.

Counties were selected as one of the bases for sampling because they were the identifiable political subdivisions about which reasonably accurate information could be obtained. The basic strategy was to select, from among the counties within our geographical limits, a limited number of diverse kinds of counties, then randomly select schools within those counties. Five counties in three states were selected. They were diverse in terms of urban-rural characteristics and per capita income; and they were geographically spread throughout a 100-mile radius of New York City.

One of the original five counties selected did not have a sufficient number of physical education specialists employed at the elementary school level, so the city of Yonkers was chosen as a substitute.

The next step in the sample-selection was to choose school districts, schools within those districts, and finally the specific classes to be taped. A random sample of five school districts was chosen from each county. Within each district, one senior high school and two elementary schools were randomly selected. The two elementary schools were selected from among the elementary schools in the district which had physical education specialists teaching classes. All of the school districts and schools originally selected participated in the study with

the exception of two districts, one in Bergen county and one in Fairfield county. Alternate random selections from the same counties were made to replace these districts.

Within each high school, on the day of visitation, one class was randomly selected from all boys or girls physical education classes taking place in a gymnasium on that day. A second class of the opposite sex was randomly selected from the remaining population of (opposite sex) classes. If coeducational classes were being offered on the day of visitation, an additional tape of a randomly selected coeducational class was made.

Of the two elementary schools selected in a district, one school was randomly assigned as "morning" and one as "afternoon." A morning class from one school and an afternoon class from the other were randomly selected. In the event that one teacher taught in both schools, a class in the second school not taught by the first teacher was selected. The last class of the morning or afternoon was excluded from the original selection to provide a back up class.

Whenever the originally selected class was not videotaped successfully, due to equipment failure or other impediments, the class which immediately followed it was taped.

The sample of videotaped classes includes 83 videotaped classes of which 40 are elementary school classes, 20 are high school girls' classes, 20 are high school boys' classes, and three are coeducational high school classes. The classes are from 60 different schools, in 20 school districts, in five counties, in three states.

Only indoor classes were included in the sample due to the limitations of the videotaping equipment used, so tapes were collected only during the indoor season, October to April.

Videotaping the Classes

During the calendar year February 1972 — January 1973, teams of three project members traveled to the 60 schools and videotaped the selected classes. Perhaps the most surprising feature of this entire operation was the cooperation of the school personnel involved. In virtually all cases we received full cooperation of the principals, department chairmen, and teachers in the selected schools, which means that they not only allowed us to tape their classes, but to tape the precise classes which we selected.

We made every effort to tape classes as they naturally occurred. Target classes were not selected until the day of visitation, so teachers did not know whether, or which one of, their classes would be taped. We urged the teachers involved to do what they would normally do, and to avoid specially prepared demonstration lessons. Cameras were placed unobtrusively in a corner of the gymnasium away from activity areas. Although we cannot claim that our presence had no effect on what transpired, the apparent effect was minimal. In fact, with few exceptions the videotaped classes closely resembled other casually observed classes taking place in the same schools.

Two taping systems were employed. System I used two cameras with wide angle lenses, and displayed a horizontally split screen picture on the monitor which covered all events taking place in the gymnasium. System II used one camera with a zoom lens, which maintained a close-up of the teacher while a second camera with a wide-angle lens focused on centers of action; these two images were also displayed as a horizontally split picture on the monitor. A cordless microphone with an F.M. tuner was used to record the teacher's remarks. The taping procedures were detailed in a training manual which was used during all taping sessions to insure uniformity in the resulting tapes. In addition, at a later time, an electronic digital clock was imprinted on each videotape so that in analyzing the tapes we could obtain precise records of the elapsed time for various events.

The Development and Use of Descriptive Systems

After collecting the tapes, we developed procedures for efficiently describing what is contained on them. These procedures, commonly referred to as "Descriptive-Analytic Systems," are essentially methods for classifying events into meaningful categories (a procedure we refer to as "coding") so that the events can be tabulated to provide a concise picture of what happened. Actually, the development and use of such systems has gained considerable popularity in recent educational research as well as in teacher education programs. See, for instance, Flanders (1970) book about "Interaction Analysis," the most widely used descriptive analytic system.

Members of the Data Bank Project have developed a variety of descriptive systems designed specifically for use in physical education. Recognizing that no one system can account for all the important aspects of a class, we have tried to develop a series of complementary systems, each of which focuses on a different aspect of the physical education setting. The systems completed to date focus on the learning activities engaged in by students, the professional functions carried out by teachers, the pattern of student activity, the pedagogical moves of the teacher, the teacher's provision of augmented feedback to students, and the teacher's role in the students' selection of learning activities. Other systems in the process of development deal with several aspects of the teacher's management of students' skill acquisition and the logical analysis of lesson sequence.

The development of a reliable descriptive system is a sizable research undertaking in itself, normally requiring two or more years to complete. It involves developing a theoretical framework, defining categories, training observers, pilot testing, and revising to the point where the system yields an objective and reliable description of a class (i.e., until two or more trained researchers can use the system on separate occasions to code a particular tape and consistently arrive at the same description).

Once a system is developed, another demanding research effort is required to use the system to code events on the videotapes and to report the results. For this reason, after one project member completed the development of a system, a second member assumed responsibility for using the system to code the tapes.

Most of the remaining chapters of this monograph report the results of the combined efforts of two researchers — one, the system developer, and the other, the system user. Laubach's system (1974) was used by Costello (1977) to describe student behavior in a sample of the videotaped classes (chapter two). Anderson's system (1975) was used by Barrette (1977) to describe teacher behavior (chapter three). Fishman's system (1974) was used by Tobey (1974) to identify the ways in which teachers give augmented feedback to students (chapter five). Morgenegg (1978) modified and applied Bellack's system (1966) to identify pedagogical moves of teachers and students (chapter six).

In addition to these studies carried out by project members, J. T. F. Cheffers and V. Mancini, who had been involved in their own independent research efforts for several years, were invited to code the Data Bank tapes using a system developed by Cheffers (Cheffers, Amidon, & Rodgers, 1974). The results of their study which focuses on teacher-student interaction are reported in chapter four.

In a sense, the publication of this monograph represents the culmination of an important segment of the Data Bank Project. We set out to study what was happening in physical education classes, to describe those happenings in objective and reliable ways, and to communicate the results to interested professionals. Within the confines of our sample of classes, and recognizing that we have used only five of many possible approaches to describing the events which transpired, we think we've come reasonably close to accomplishing our objectives.

Of course the work continues. Additional systems are being developed and may be used to provide further descriptions of reality. Still other researchers are involved in simplifying some of the descriptive systems for use in teacher education settings. The ultimate intent is to have teachers code their own videotaped classes and use the data to make decisions about how to improve those classes.

Characteristics of the Videotaped Classes

The chapters that follow describe events in physical education classes as they appear on the particular sample of videotapes collected by the Data Bank Project. To properly interpret those descriptions, you should be reasonably familiar with some of the more important characteristics of that sample.

To begin with, the sample of classes is the product of the random selection procedures discussed earlier. In following these procedures, we tried to eliminate any systematic bias (on our part or the school's part) from influencing the choice of classes. In effect, the classes taped

were those that the random selection process told us to tape; not the classes that, for one reason or another, the school might have preferred us to tape, or we might have wanted to tape.

Table 1.1 shows the distribution of classes by grade level and sex of the students enrolled (Barrette 1973).

Table 1.1
Videotaped Classes by Grade and Sex

Grade	Total Classes	Girls Only	Boys Only	Co-Ed
1	4	0	0	4
2	3	0	0	3
3	7	0	0	7
4	8	1	2	5
5	8	3	2	3
6	7	3	3	1
5 and 6	2	1	1	0
7	0	0	0	0
8	1	1	0	0
9	7	2	5	0
10	3	1	2	0
9 and 10	6	4	2	0
11	2	1	1	0
10 and 11	1	0	1	0
12	2	0	2	0
10, 11 and 12	4	3	1	0
11 and 12	10	6	3	1
9, 10, 11 and 12	8	3	3	2
Totals	83	29	28	26

The mean length of the videotaped classes (based on scheduled class time) was 40 minutes. At the elementary level, student enrollment per class ranged from 10 to 56; while the mean class size was 28. Boys' high school classes ranged in size from 9 to 80 students, with a mean class size of 34. Girls' high school classes ranged in size from 12 to 90, with a mean class size of 40.

As mentioned earlier, technical limitations prevented us from videotaping outdoor classes. Thus, we confined our data collection to indoor classes occurring in the late Fall, Winter and early Spring. The taped classes were distributed by month as follows: October - 2, November - 14, December - 14, January - 13, February - 17, March - 17, and April - 6. Obviously, this means that the sample reflects only those types of indoor classes that occur during these times of the year. Thus, classes focusing on activities normally conducted outdoors such as football, softball, and tennis, do not appear in the sample.

Each class was taught by a different teacher, and 83 teachers are represented in the sample. All teachers were specialists in physical education. Forty-seven were men; 36 were women. Their median age was 29. All except one teacher held at least a baccalaureate degree. Their undergraduate preparation was in 40 different colleges, spread

throughout 17 states. Twenty-four had earned a Master's degree; 28 others had completed some graduate work; and 31 had no graduate level preparation.

One way to gain an appreciation of the flavor of the classes included in the sample, is to examine the activities which provided the focus for teacher-student interaction. The results of a preliminary study (Costello 1973), showed the different kinds of activities that occurred and their distribution among the classes (See Table 1.2).

Table 1.2

Distribution of Activities

	Total classes (N=83)		*Elementary school (N=40)*		*High school (N=43)*	
Activity	*No. of classes in which activity occurred*	*% of total classes*	*No. of classes*	*% of Elementary classes*	*No. of classes*	*% of H.S. classes*
Calisthenics	43	52%	21	53%	22	51%
Basketball	32	39%	12	30%	20	47%
Gymnastics (apparatus, floor exercise	18	22%	9	22%	9	21%
Volleyball	12	14%	1	2%	11	26%
Games of low organization	9	11%	9	23%	—	—
Running (laps, sprints)	9	11%	6	15%	3	7%
Floor hockey game	5	6%	2	5%	3	7%
Parachute activities	5	6%	5	12%	—	—
Soccer	4	5%	2	5%	2	5%
Relay races	3	4%	2	5%	1	2%
Wrestling	3	4%	1	2%	2	5%
Movement exploration	3	4%	3	7%	—	—
Circuit training	2	2%	—	—	2	5%
Modern Dance	2	2%	—	—	2	5%
Scooter activities	2	2%	2	5%	—	—
Other	16*					

* Each of the following activities was observed *once:* team handball, weight training, folk dance, track and field (high jump), ping pong, hula hoop activities, Indian wrestling, rope jumping.

This then is the sample of classes on which our descriptions of events in physical education are based. Clearly it is a regional sample, limited to certain areas of New York, New Jersey and Connecticut. In a sense, it is an historical sample, limited to what happened in 1972-1973. Further, it is confined to indoor physical education classes which took place during certain seasons and focused on certain activities. What happened in these classes may or may not reflect what is happening today, or what happens in other parts of the country, or what happens outdoors during other seasons when other activities predominate. Yet despite all these limitations, the Data Bank tapes, to our knowledge, are the most extensive recorded sample of physical education classes in existence. Please keep these things in mind as you read on.

What to Expect in Subsequent Chapters

In the chapters which follow we have tried to present information in readable and readily interpretable fashion, and to avoid the excessive use of research jargon and the deadening impact of formal research writing style. In effect, we have attempted to communicate the results of our research to a broad public, and not to a restricted group of like minded researchers. Those interested in a detailed account of research procedures, raw data, supportive tables, calculations, and the like are invited to consult the original research documents referenced in each chapter.

Each chapter reports on the development of a descriptive system, and the description of events that resulted when the system was used to code the tapes. In keeping with our basic intent, the major portion of each chapter is devoted to reporting the descriptive findings — only the briefest possible accounts of system development are provided. To accurately interpret the descriptive results, however, you will have to be reasonably familiar with the systems used to obtain those results; so key definitions and important procedures are outlined. We have decided against trying to provide all of the information needed to enable the reader to use the coding system reliably — that would have required a separate monograph.

Descriptive studies produce massive amounts of data that can be viewed from a variety of perspectives. For example, Barrette's (1977) study yielded in excess of a quarter of a million bits of data. It is not unusual for the original reports of these studies to contain 30 or 40 tables of results — and even this number of tables represents a narrowing down of the results that might have been reported. So what we have done in this monograph is *summarize* the data as best we can, and report only those aspects of the data which we think will be of widest interest.

If you learn one thing from doing descriptive research on teaching, it's that the teaching-learning setting is incredibly complex. The more features of the setting you describe, the more you realize how many other features remain to be described. We are fully aware of the complexities of teaching. We have no illusions about the *completeness* of the description of reality we provide in the following chapters. Each study captures a small piece of reality, and together the studies still only encompass five small pieces of reality. Much of what happened in those 83 classes remains unaccounted for in our reports. So don't be surprised if you find yourself asking, "Why didn't they find out more about this aspect of the class?" or, "Why didn't they study that relationship?" On the other hand, despite the incompleteness of our accounts, we did try to carefully select the events to be studied based on the implications of educational theory, the recommendations of respected authorities, and on our own professional judgments. There is reason to believe that much of what *is* described is educationally and professionally significant.

Another important factor to keep in mind as you prepare to read on, is that these are essentially *descriptive* studies. They tell what happened; not what should or should not have been done. For the most part, you will have to provide the evaluative judgments. You will have to decide whether or not certain existing practices, modes of behavior and the like, make sense as desirable approaches to teaching and learning in physical education. Of course, from time to time in discussing the results, the researchers will pass judgments on selected features of the findings in an effort to expand your thinking, as well as to make their own position known.

Using the Descriptive Data

Since the findings presented here are essentially *descriptive*, people accustomed to consuming only prescriptions for or evaluations of teaching may have difficulty deciding what to do with such descriptions. Members of the Data Bank group have found a variety of valuable uses for this kind of information. Our hope is that other physical educators will find similarly valuable uses.

For example, perhaps individual teachers will examine these accounts of events, assess the extent to which events in their own classes resemble the norms described, evaluate the appropriateness of what they and others are doing, and make the changes called for. Or perhaps teacher educators might use the data as one source of evidence in designing teacher training programs. A broad familiarity with what teachers already do should serve as an informative base for determining what to train them to do (and possibly what to avoid) in the future. Those in leadership positions might use descriptive accounts to assess the state of the art of physical education, and to decide on broad strategies for influencing current practice. Personally, we'd be satisfied if these studies just made those of us in physical education more acutely aware of who we are and what we are doing.

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[1] Data Bank Participants: Gary Barrette, Linda Catelli, John Costello, Rachelle Goldsmith, Richard Hurwitz, Sue Kelly, Edward Kennedy, Susan Laubach, Mitchell Levison, Bruce Morgenegg, Charles Tobey, Leroy Weisberg and William Anderson.

Chapter Two

Student Behavior

JOHN COSTELLO
SUSAN A. LAUBACH

Most of us have general impressions of how students spend their time in physical education classes. But how accurate are those impressions? If we carefully studied the behavior of individual students what patterns of involvement would we find? For instance, to what extent do students spend their time performing tasks directly related to accomplishing the objectives of physical education? On the other hand, how much time is wasted in inactivity or idleness? Is it possible that the inadequate skill levels achieved by some students are due, in part, to their inappropriate use of class time, or perhaps to the teacher's inappropriate arrangement of that time? These and similar questions prompted Laubach (1975) to develop a system called BESTPED (an acronym for *BE*havior of *ST*udents in *P*hysical *ED*ucation), which objectively and sequentially describes how each student actually spends his/her time in class.

This chapter reports on the results of a study which used the BESTPED system to describe the behavior of 193 students in 20 different physical education classes (Costello, 1977). The portrait of student behavior which emerges from this study is, we believe, an interesting commentary on the state of the art of physical education in the schools.

The BESTPED System

Development of the System

The development of the system progressed through several stages. To clarify the theoretical framework, focus, dimensions, categories, definitions, and terminology of the system, professionals knowledgeable in physical education and descriptive analytic research were consulted. To modify and refine the system, pilot tests were conducted involving trained individuals who coded student behavior with the forms of the system which existed at that time. To determine system reliability and validity three coders were selected and trained to use the system. Each independently coded the behavior of randomly selected students from a wide variety of physical education classes. The percent of agreement between coders was derived from the number of agreements over the total number of units recorded. The overall inter-judge reliability of the system was 94.5%. To determine the intra-judge relia-

bility (consistency), each coder recoded the behavior of the same students one week later. A comparison was made between each coder's first and second codings. The overall intra-judge reliability was 94.1% (Laubach, 1975).

Description of the System

There are three forms of the BESTPED system. Forms II and III are simplified versions of the system designed for use by teachers. Form I, the form used in this study, is primarily for use in research and consists of four dimensions: 1) *The Function Dimension* which describes what the student is doing, 2) *The Mode Dimension* which describes whether the student is moving or not moving, 3) *The Content Dimension* which identifies the activity in which the student is participating, and 4) *The Time Dimension* which indicates the duration of each behavior. The system is outlined in Figure 2.1 and brief descriptions of the system categories in the *Function* and *Mode* Dimensions are presented in Table 2.1.

Figure 2.1
Overview of the BESTPED System

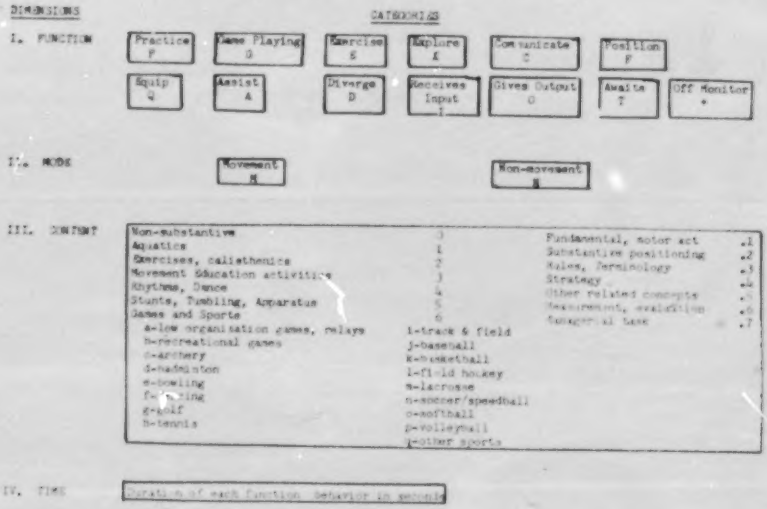


Table 2.1
BESTPED System: Descriptions of Categories in Function and Mode Dimensions

Function Dimension:

Practice (Pr is performing, often repeatedly, for the purpose of learning or effecting a change in behavior and for improving performance or proficiency

in executing a motor act or task. This category includes execution of skill drills and fundamentals, participation in stunts, tumbling, apparatus, skill tests, swimming, mimetic movements, rhythmical work and "free play."

Game Playing (G) is participating in any modified, lead-up or official game such as basketball, dodgeball, or kick ball. The game has a definite beginning and end, rules, competition between two or more, activity towards the achievement of some goal, and usually some type of scoring.

Exercise (E) is performing the same movements, usually repeatedly and consecutively, to a count or within a time limit. The purpose(s) of exercises or calisthenics may be to warm-up, condition, increase or maintain fitness, and/or prepare for subsequent motor activity.

Explore (X) is investigating the environment and/or the constructs of movement, concepts and emotions. It is trying to or planning to move in different ways, to discover or select alternatives, and to find as many ways as possible to move. The process used to achieve the goal is chosen by the student.

Express/Communicate (C) is presenting through movement one's ideas, opinions, concepts or emotions about some object, idea, concept, or emotion. Included are non-verbal gestures, movement education experiences where the purpose in performing is to express one's self and/or to communicate, and the performance of a finished product in modern or interpretive dance, a movement routine or a synchronized swimming routine.

Position (F) is locating or re-locating oneself or body part and changing posture. Examples are entering and leaving class, going to and from formations and standing up.

Equip (Q) is obtaining, retrieving, distributing, setting up, maintaining, dismantling and returning materials and/or equipment.

Assist (A) is helping another or others learn, perform or execute some task. Examples are spotting, demonstrating and officiating.

Receive Information (I) is being available for, or directing one's attention for stimulation or input, such as listening, observing, reading and using audio-visual aids. Included, also, is mental practice.

Give Information (O) is talking, discussing, writing or drawing.

Await (T) is engaging in a "holding" behavior until engaging in a new or different behavior. Examples are resting, waiting one's turn to practice, and waiting for the teacher to begin an activity.

Diverge (D) is performing or engaging in any miscellaneous personal motion or task, or exhibiting any behavior not classified in another category, such as combing hair or fighting.

Off Monitor (+) signifies that the student is not in sight and that the coder cannot code his/her behavior with a high degree of certainty.

Mode Dimension:

Movement (M) is an observed change in location or in space of oneself, body parts or posture. It is motion of the body as a whole or of its parts. Included are locomotor movements, non-locomotor movements, isometrics, balancing activities, motor acts or tasks such as throwing and kicking, and personal tasks such as fighting.

Non-movement (N) is the opposite of movement. It is maintaining the same relative, stationary position with no observed (or very minimum) motion of the body parts.

Coding Procedures

A coder observes *one student at a time* for a specific amount of time. Using the *Function Dimension*, the coder first asks, "What is the student doing as described by the categories in this dimension?" When each behavior commences, the coder selects the code (letter) of the category which best describes the behavior and places it in the *Function Dimension* column (see coding sample below). Then the coder records an M or N for movement or non-movement in the *Mode Dimension* column. Next the codes which best describe the activity are selected from the *Content Dimension* and are placed in the appropriate column. The duration of the function behavior is recorded in seconds in the *Time Dimension* column. Each time a new function behavior begins this procedure is repeated. The coding sample presented in Table 2.2 should help to clarify the procedure.

Table 2.2
Coding Behavior with the BESTPED System

Behavior sample	CODING Function	Mode	Content	Time
1. Student walks into class and goes to squad (twenty seconds).	F	M	0	20
2. Student sits in squad and while waiting does a forward roll on the floor.	T	N	0	31
3. Student listens to teacher making announcements.	I	N	0.7	39
4. Student listens to rules about basketball.	I	N	6k.3	52
5. Student goes with squad to drill formation.	F	M		14
6. Student waits turn in line. Teacher gives hint for a better performance.	T	N		14
7. Student practices two jump shots.	P	M	6k.1	18
8. Student goes to end of line.	F	M		7
9. Students waits (stands) in line.	T	N		15

Limitations of the System

The portion of reality described by the BESTPED System is limited as is the case for all systems. For instance, at a given time its use is limited to observing just one student unless several coders are observing several students. Only those behaviors defined by the categories

are recorded. Interaction is not accounted for, nor are each person's verbal responses recorded. What the teacher does is not directly or completely accounted for.

Application Of The BESTPED System

The *BESTPED* system was used to code student behavior from the Data Bank videotapes. System I videotapes, which covered the entire gymnasium and provided a greater assurance that a student was available for continuous coding, were selected to observe student behavior. Sampling was further restricted to the twenty elementary school videotapes. There were many reasons for choosing to focus on elementary classes not the least of which was a personal interest in programs at that level. Furthermore, the observation of a larger number of students on one school level (as opposed to the observation of a smaller number of students on each of two school levels) would result in a more representative sample of the group's behavior.

Out of a total of 469 students from the twenty classes, 193, (about 40%) were randomly selected and observed in three separate five minute segments (a total of 15 minutes per student). Forty per cent of the students in each class were randomly selected for coding. In the thirteen coeducational classes, 40% of each gender were randomly selected for coding. For a specific description of the sampling procedure, see Costello (1977).

The Mode and Function of Student Behavior

Given physical education's unique goal of attempting to achieve various educational objectives via the medium of movement, two of the initial questions we were interested in answering were, "How much time did students spend moving in their physical education classes?", and, "How much of that movement was substantive, i.e., movement that facilitated the accomplishment of such objectives as motor skill acquisition, physical fitness, etc.?" The data obtained from coding behavior in the Mode Dimension of the *BESTPED* system provided some answers to these questions.

The 193 elementary school students were observed collectively for a total duration of 178,454 seconds.[1] The students spent slightly less than two thirds (63.2%) of the total time they were observed in *non-movement* behavior; or conversely, they spent a little more than one third (36.8%) of their time *moving* in physical education classes. Slightly more than one fourth (27.5%) of their time was spent in movement related to the accomplishment of various physical education objectives.

At a more specific level, we were also interested in determining how students spent their time in terms of the function dimension of the BESTPED System. Table 2.3 indicates that students spent the largest portion (35.4%) of the total time they were observed *awaiting*. This

Table 2.3
Duration of Functions for all 193 Elementary School Physical Education Students and for the 20 Different Classes

FUNCTION	STUDENTS Duration in Seconds	STUDENTS Percent of Total Duration	STUDENTS Mean Duration (Secs) per Occurrence	CLASSES Percent of Total Duration Range	CLASSES Median	CLASSES Mean	CLASSES Standard Deviation
Practice	25,762	15.3	17.4	0.0-47.5	7.3	13.6	15.8
Game-playing	17,427	10.3	40.4	0.0-56.1	2.1	11.1	16.8
Exercise	6,141	3.6	18.7	0.0-20.2	2.6	3.8	4.8
Explore	253	0.2	18.1	0.0- 3.4	0.0	0.2	0.8
Express/ Communicate	904	0.5	8.5	0.0- 2.2	0.2	0.5	0.7
Position	6,874	4.1	7.0	0.6-15.6	3.1	4.3	3.7
Equip	5,808	3.4	11.8	0.0-14.2	2.1	3.1	3.6
Assist	1,678	1.0	18.6	0.0- 8.0	0.1	1.0	2.0
Diverge	956	0.7	15.9	0.0- 5.6	0.2	0.6	1.3
Receive Information	42,798	25.4	21.1	2.8-58.5	20.6	25.8	14.8
Give Information	150	0.1	6.5	0.0- 0.6	0.0	0.1	0.2
Await	59,703	35.4	26.1	7.8-65.1	35.5	36.0	20.5

function was generally characterized by waiting in line for a turn to participate in either a practice trial or game. Students also spent a relatively large portion (25.4%) of their time *receiving information*. Although this information could have been received from various sources, it generally took place through teacher talk. One can easily determine that students spent almost two thirds (60.8%) of the total time they were observed either waiting or listening to the teacher.

In contrast, students engaged in motor activites for less than one third of the total time their behavior was coded. For example, they spent 15.3% of their time *practicing* motor skills and 10.3% of their time *gameplaying*. In addition, the students engaged in *exercise* 3.6% of the time but hardly ever (0.2%) engaged in *exploring* behaviors.

Since students do not exist as entities unto themselves but are members of a class, their behavior will be influenced by various factors operating within their particular classes, i.e., the activity, methodology used, class composition, equipment, etc. Thus, another question we asked was, "How are functions distributed by class?" The second half of Table 2.3 provides the answer to this inquiry. All classes spent some time *awaiting;* the range was from 7.8% to 65.1%. In addition, all classes also spent some time *receiving information;* the range was from 2.8% to 58.4%. In contrast, while some classes spent time *practicing* motor skills, others did not engage in that function. Similarly, some classes spent a major portion of their time *gameplaying*, while others did not spend any time in this function.

Based on the above results, one might ask, "Why did students seemingly spend a large portion of their time in non-movement activity and relatively small portions of their time engaged in functions related to the accomplishment of various physical education objectives?" First of all, the nature of the physical education activities in this sample might have required students to spend more time awaiting than they normally would have in other physical education activities. For example, in this sample, six classes focused primarily on gymnastic activity. Students in these classes spent relatively short periods of time in concentrated practice on a piece of apparatus and relatively long periods of time resting or waiting for their next turn on the apparatus. Although this pattern of behavior may not be indicative of all gymnastic classes, it did occur frequently in the classes in this sample. Furthermore, several other classes in the sample were characterized by activities in which students participated in a game for a relatively short period of time, then waited a relatively long period of time for their next opportunity to participate.

Second, since teachers are in charge of a class, students are a captive audience. In this sample, teachers provided information for about one-fourth of the time that students were observed. Students normally received this information while in a rather passive non-movement position. Extensive teacher talk was probably not only a function of the teacher's personality, but was also a function of the nature or purpose

of a particular lesson. For example, in the twenty classes, lengthy teacher instruction occurred when a new game was introduced, a complicated strategy was explained, and rules of a sport were reviewed.

Third, the organizational ability of the teachers probably also contributed to the large percentage of time that students awaited. For example, during the coding of student behavior for almost 300 clock hours, it was evident that some teachers had trouble organizing groups for an activity, making the maximum use of available equipment, and moving groups from one area to another.

Class content, teacher talk, and teacher organizational ability are only several possible reasons that could have accounted for the large percentage of time students spent in non-movement behavior. Student motivation, class composition, and a host of other factors also could have contributed to this result.

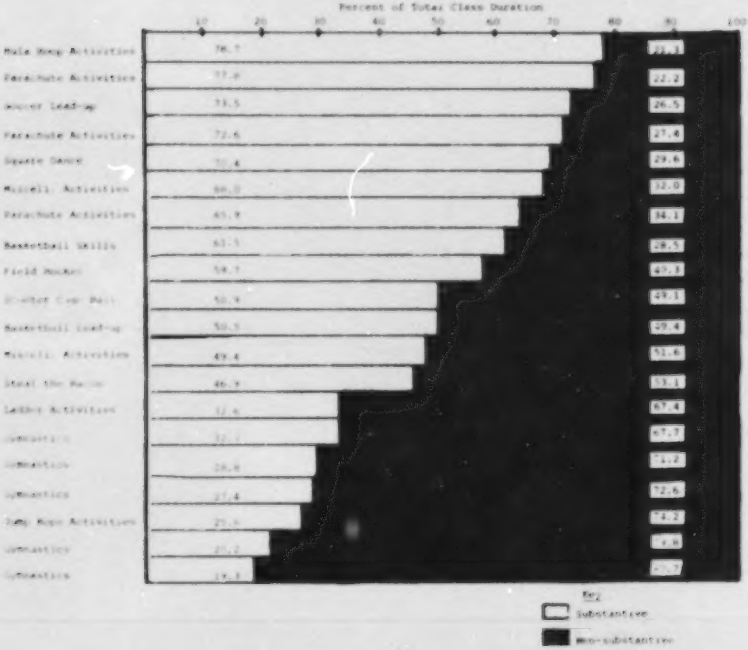
Students spent the largest portion (29.1%) of their substantive activity time either playing or receiving information about *sports and games*. As one might expect with elementary school physical education students, most of this time was spent in *games of low organization* (26.4%) and not in actual official games (2.7%). While students were involved in *gymnastics* for 5.9% of the time they were observed, they hardly ever (0.5%) engaged in *movement education* activities.

Further analysis indicated the percentage of time students spent in substantive and non-substantive activity within each of the 20 classes in the sample. Each class was simply defined by the substantive activity in which the majority of students were engaged for the greatest amount of time. For example, if all the students in a class performed calisthenics for a short period of time and then the rest of the students practiced gymnastics for the remainder of the class, the class was termed "gymnastics."

As Figure 2.2 indicates, substantive activity time ranged from 19.3% in a gymnastics class to 78.7% in a hula hoop activities class. In this sample, five of the six classes with the lowest percentage of substantive activity time were gymnastic classes. In contrast, students in game-playing classes (e.g., basketball, soccer, field hockey, etc.) usually spent 50% or more of their time in substantive activity.

One of the more surprising results obtained from coding student behavior in the Content Dimension of the BESTPED System was the almost total non-existence of movement education activities. This result was contrary to what was expected when one considers that within the past two decades movement education has become an integral part of many teacher education programs in physical education and, in addition, has been incorporated into many elementary school physical education programs.

Figure 2.2
Percent of Duration Devoted to Substantive and Non-substantive Activity for Each Class



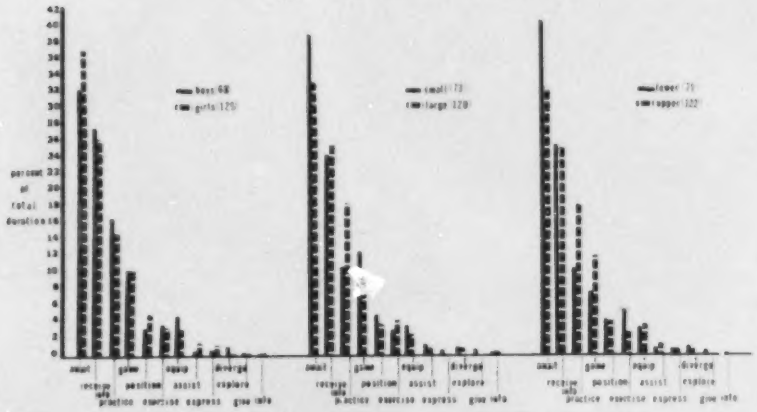
The Relationship Between Student Behavior and Selected Variables

Another set of questions we were interested in answering was, "Are there any differences between the behavior of boys and girls, students in small and large classes, and students in lower and upper grade elementary school classes in terms of the various functions of the BESTPED System?"

Functions By Student Gender

Of the 193 students in the sample whose behavior was coded, 125 were girls and 68 were boys. Figure 2.3 summarizes the percentage of time collectively spent in each function by boys and girls. Girls spent somewhat more time (37.1%) *awaiting* than boys (32.4%). However, girls spent slightly less time (24.3%) *receiving information* than boys (27.4%). Boys devoted more time (16.6%) to *practice* than girls (14.6%), but both sexes spent approximately equal time *gameplaying* (boys, 10.3%; girls 10.4%).

Figure 2.3
Percent of Duration Devoted to Each Function by:
a) Boys and Girls; b) Small and Large Classes; and
c) Upper and Lower Grades



A secondary approach used to describe functions in relation to student gender was to examine only those classes in which both boys and girls were enrolled. By deleting from the sample the classes in which only girls were enrolled, 57 girls were compared to 68 boys in terms of their function behaviors. Results indicated that girls still spent more time (36.7%) *awaiting* than boys (32.4%); less time (24.5%) *receiving information* than boys (27.4%); and more time (10.9%) *gameplaying* than boys (10.3%). However, in this sample, girls spent almost as much time (16.0%) *practicing* as the boys.

Girls in this sample spent slightly more time in gameplaying than the boys and almost as much time practicing motor skills. Girls spent more time awaiting than boys largely because of the fact they were observed in classes which required them to wait a long time before they could participate.

Functions By Class Size

The median class size for the twenty classes was 22, with a range from 10 to 47. Those classes containing fewer than 23 students were termed "small" classes, while those classes containing more than 22 students were termed "large" classes. Figure 2.3b indicates the percentage of time collectively spent in each function by students in small and large classes.

Students in small classes *awaited* 39% of the time and those in large classes 33.3% of the time. Students in small classes *received information* for slightly less time (24.5%) than students in large classes (25.9%). While students in large classes spent a larger portion (18.3%) of their

time *practicing* than those in small classes (10.3%), the students in small classes spent more time (12.3%) *gameplaying* than those in large classes (9.2%).

Small class size is frequently advocated by educators. Proponents of this viewpoint argue that in small classes students receive more individual attention, are more involved or active in their classes, and therefore will be more likely to achieve established objectives. The results from this sample of student behavior do not support the view that students in small classes are more physically active than students in large classes. Unexpectedly, the students in small classes spent more time awaiting, while the students in large classes spent more time in the combined functions of practice, gameplaying, and exercise. Perhaps as a result of experience, teachers of large classes have learned to organize their students more efficiently and therefore get them into substantive activity more quickly than teachers of small classes.

Functions By Grade Level

Students in classes ranging from the first to sixth grade were part of the sample. Classes from the first to third grade and those from the fourth to sixth grade were classified as lower and upper grade level classes, respectively. Figure 2.3c indicates the percentage of time collectively spent in each function by students in the lower and upper grades.

Students in the lower grades spent 40.6% of their time *awaiting*, whereas students in the upper grades spent 32.4% of their time in the same function. While students in both grade levels *received information* for approximately equal time (lower, 25.6%; upper, 25.3%), students in the upper grades spent more time (18.1%) *practicing* and *gameplaying* (12.0%) than students in the lower grades (10.5% and 7.6%, respectively).

Some educators and laymen assume that students in the lower elementary school grades are naturally more "active" than their counterparts in the upper grades. However, the results from this sample of student behavior do not support this viewpoint. While students in the lower grades spent more time awaiting than students in the upper grades, the upper grade students collectively spent more time in gameplaying and practice than the lower grade students. This result might have been attributed to such factors as the nature of the activity engaged in by the lower grade students, the organizational inefficiency of lower grade teachers, and the fact that lower grade students received more non-substantive information than upper grade students. Lower grade teachers discuss non-physical education matters with their students much more often than upper grade teachers.

Functions By Class Segment

Because of the sampling technique utilized, data were also available

to make comparisons between student behavior in the beginning, middle, and latter portions of a class. An analysis of this information indicated the varying degrees to which students participated in different functions during different portions of the class. The results indicated that students spent more time in some functions during one segment of the class than during other class segments. For example, *exercise* occurred almost exclusively in the beginning part of the class (95.6%). Students also spent more time *receiving information* in the beginning of the class (44.1%) than in the middle (29.9%) and latter part of the class (26.0%). They also spent considerably more time *awaiting* during the middle of the class (38.8%) than in the beginning of the class (26.1%). While students spent the largest portion of their *practice* time in the middle part of the class (39.6%), *gameplaying* predominated in the latter part of the class (51.3%).

What do these results about student behavior in different class segments indicate? Perhaps they provide some evidence, at least indirectly, about the methodology used by the teachers in the sample. It appears that student behavior approximates what might occur during a "traditionally" organized class period. Thus, students exercised almost exclusively and received information for a large portion of their time in the beginning of the class; they spent the largest portion of their practice time in the middle of the class; they continued to practice and also spent the largest portion of their gameplaying time in the latter part of the class.

Implications for Physical Education Teachers

What do all of these analyses mean for teachers of physical education? As a consequence of having examined what happens in other teachers' classes, they may be prompted to take a closer look at their own teaching. Having done so, they might react in a variety of ways.

A teacher might agree that the results of this study are indicative of student behavior in general, and in his/her class in particular. Furthermore, this teacher might be completely satisfied that this is the way that students should spend their time in physical education classes. For example, the teacher might argue that students need to spend a great deal of time receiving information from a teacher, that students need a great deal of time to wait and synthesize that information (if that is what students do when they wait), and that students need time to implement that information in some substantive movement form. It is quite possible, therefore, that the results of this study might reinforce a teacher's opinion of what students should do in physical education classes.

Another teacher might disagree with, or simply not care about, the results of this study. For such a teacher, these findings about student behavior may not be indicative of what happens in physical education in general and in his/her class in particular. Or, this teacher might consider such information interesting, but not regard it as a valid

stimulus to change either teaching or student behavior. This teacher might prefer to wait for more definitive research results before implementing any changes.

Another teacher might agree that the results of this study are indicative of what students do in physical education in general and in his/her class in particular, but, unlike the first teacher, might conclude that students should utilize their time more efficiently in the gymnasium. This teacher might want students to spend more time in substantive movement during physical education activities in order to facilitate the accomplishment of various objectives. This desire to increase the time that students spend in substantive movement might be accomplished in several ways. First, a great deal of awaiting time might be reduced by:

a. improving general class organization procedures such as having smooth transitions from one phase of the lesson to another;
b. making maximum use of available equipment or providing alternative activities while students are waiting to use equipment;
c. providing games where students are included as continuously as possible, rather than being excluded from playing for long periods of time. For example, in dodge ball, instead of having a student sit down when he/she is hit, a teacher could let the student continue to play and simply give him/her a penalty point. At the end of the game, the team with the least penalty points would be declared the winner.

Second, a teacher could very easily diminish talking time by efficient planning. For example, a teacher could concisely identify procedures for skill execution to students, delineate efficient organizational methods, and provide short cues about environmental stimuli and relevant feedback during motor performance. If teachers talk less frequently and students spend less time awaiting, more time could be provided for students to engage in such *substantive movements* as *practice, gameplaying, exercise, explore*, etc.

From an entirely different perspective, on the basis of this study's findings, a teacher might also choose to make some judgments about the methodology used in teaching physical education. For example, a teacher might decide that students should have more opportunity and responsibility for their own learning. This might be accomplished by using alternative styles of teaching such as "guided discovery," "problem solving," etc. A student taught by such methods would probably get more opportunities to *explore* the environment in order to solve various motor problems; *give information* or engage in dialogue with the teacher and other students, and *assist* the teacher or other students in the class.

Of course, all of these implications relate only to the quantity of time students spend in substantive movement. Admittedly, the quality of instruction within classes has a great bearing on student learning and most certainly both quantitative and qualitative aspects of performance are important considerations in accomplishing the objectives of physical education.

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FOOTNOTE

[1] Student behavior was actually coded for a duration of 173,700 seconds. However, there were 289 instances of *off monitor* codes which lasted a total of 5,246 seconds, or about 3% of the total coding time. All subsequent percentages were derived from the total time of 168,454 seconds that students were available for coding.

Chapter Three

Teacher Behavior

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Teachers are pivotal figures in gym classes, not only do they arrange appropriate learning activities for students, they must judiciously allocate their own time so that their instructional expertise is effectively used. Our interest in how teachers spend their time led us to undertake this investigation. Some of the questions that intrigued us and to which we sought answers were: Do teachers devote a major portion of their efforts to providing instruction, or as some critics contend, do they essentially "roll out the ball" and watch the kids play? Do they get bogged down with organizational and administrative matters, leaving little time for anything else? How much of their time is spent dealing with behavior problems? Are they active participants in the movement experience of the class, or are they essentially spectators and officials? Do they take time to interact with individual students, or do they concentrate on communicating with groups? What modes of communication do teachers use? To what extent do the behaviors of different teachers resemble one another? In what ways do the behavior patterns of physical educators resemble or differ from the patterns displayed by classroom teachers?

This report presents some of the information we collected in our attempt to find answers to these and other questions. The scope of our effort, i.e., to describe teacher behavior, was ambitious to say the least. As you might expect, the extent to which we were able to provide definitive "answers" to the questions posed is limited.

The Descriptive System

Anderson's (1974) Descriptive System was used in this investigation. The system was developed over a period of two years. The development was guided by the intent to produce a "professionally meaningful" description of teacher behavior. Categories were designed to classify teacher behavior using terminology and concepts that were familiar and had common meanings among professionals.

After numerous pilot tests and countless revisions of category definitions and coding procedures, the System was subjected to a formal reliability test. Acceptable levels of agreement between coders was achieved for each of the major dimensions of the system — ranging from 86.7% agreement to 99.6% agreement (Anderson, 1974).

The system that emerged from these developmental procedures contains a comparatively large number of categories grouped together under four different dimensions: interactive function, subscripts, mode, and direction. Each observed unit of teacher behavior is coded four times, by choosing the category within each dimension that best describes what the teacher is doing. In this way, each segment of behavior is described in terms of its purpose, the mode of communication used, to whom it is directed, and whether the carrying out of the function is shared by students. In addition, the elapsed time for each different behavior is recorded. A summary description of the System appears in Table 3.1. Detailed definitions and ground rules for coding appear in other sources (Anderson, 1974; Barrette, 1977).

Table 3.1

Dimensions and Categories of Teacher Behavior

The definitions which appear below are simplified and abbreviated versions of the actual definitions. The definitions for categories with self-explanatory titles are omitted.

DIMENSION: INTERACTIVE FUNCTION — Identifies the purpose of the teacher's interactive behavior.

Categories:

1. Preparing for Motor Activities* (*games, sports, exercises, exploratory and fundamental movements).
   - 1.1 Organizing: Providing information to students about their location, position, grouping, role, order of performance, etc.
   - 1.2 Preparatory Instructing: Providing information about activity to be performed, i.e. rules, skills, etc.
   - 1.3 Providing Equipment or Readying the Environment: Interacting to provide equipment or get environment ready.
2. Guiding the Performance of Motor Activities.
   - 2.1 Concurrent Instructing: Providing instruction to student(s) while they are performing activity.
   - 2.2 Officiating: Performing duties of an official such as regulating starting/stopping of activity, enforcing rules, keeping score.
   - 2.3 Spotting: Interacting with students for the purpose of protecting them against injury, assisting them, and positioning oneself for the above.
   - 2.4 Leading Exercises: Counting cadence, regulating performance of exercises, etc.
   - 2.5 Intervening Instruction: Providing instruction to students regarding their past performance of the activity.
3. Observing the Performance of Motor Activities: Silently attending to student(s) who are performing motor activities. (Only silent periods of five seconds or more are recorded.)
4. Participating in Motor Activities: Performing as a participant in a motor activity (not leading or demonstrating).
5. Other Interacting Related to Motor Activities: All other interactions directly related to the motor activities which do not fall in the above categories, e.g. history of activity, spectator behavior, current events related to activity.
6. Other Interactive Behaviors:
   - 6.1 Administering: Interacting with students to carry out school/class policies, e.g. attendance, dress, schedules, excuses.

6.2 Establishing and Enforcing Codes of Behavior: Interacting to influence student's social/personal conduct, e.g. disciplining, commanding appropriate behavior.

6.3 Other Interacting: All other interactive behaviors which do not fall into above categories.

7. Non-Interactive Intervals: Periods of five seconds or more during which no interactive function is being carried out.

7.1 Dealing with equipment.

7.2 Other Non-Interactive Behaviors: Tying shoes, looking out window, reading, etc.

8. Non-Discernable Intervals: Periods of five seconds or more during which you cannot determine whether the teacher's behavior is interactive or non-interactive.

8.1 Insufficient Audio-Video.

8.2 Absent from Gymnasium.

DIMENSION: FUNCTION SUBSCRIPTS — Indicates the extent to which the teacher carries out the function himself/herself, or shares it with others.

Categories:

1. Does: The Teacher's behavior carries out the function.
2. Shares: The teacher and student share in carrying out the function.
3. Delegates: The teacher delegates the carrying out of the function to the student(s).

DIMENSION: MODE — Identifies the way(s) in which the teacher interacts with others, i.e. the ways in which he/she conveys messages to others, receives messages from others or acts upon them.

Categories:

1. Talks
2. Listens
3. Observes
4. Demonstrates
5. Uses Student Demonstrator
6. Uses Audio-Visual Aids
7. Uses Signaling Devices
8. Writes or Provides Written Materials
9. Manually Assists
10. Participates
11. Performs Physical Task

DIMENSION: DIRECTION — Identified the other person(s) toward whom the teacher's behavior is directed.

Categories:

1. One Student
2. Group/Whole Class of Students
3. One Student and Group/Whole Class
4. Other Persons (other than enrolled students)
5. Other Combinations (of above)

The best way to understand the System is to see how it is used to code a sample of teacher behavior. The examples provided in Table 3.2 describe what the teacher is doing and how the behavior is coded. The numbers in parenthesis indicate the elapsed time (from the beginning of the period) at which the behaviors began and ended. The function dimension is the key coding dimension that determines the beginning and the end of each behavioral unit; the coder watches the teacher, identifies the function being carried out, identifies the moment at which it starts and ends, and then codes the appropriate categories for the other dimensions. One category is selected for the subscript and direction dimensions; multiple categories may be selected for the mode dimension.

Table 3.2
Teacher Behavior System: Coding Samples

Unit	*Sample of Teacher Behavior*	*Code*	
1.	(begin 3:02) "Class please come over here and sit down" — (teacher watches students as they move to positions — (end 3:17)	Function:	organizing
		Subscript:	does
		Mode:	talks
		Direction:	whole class
		Duration:	16 seconds
2.	(begin 3:18) "Jill would you please hand me that ball" — (Jill hands ball to teacher) — (end 3:22)	Function:	providing equipment
		Subscript:	delegates
		Mode:	talks and performs physical task
		Direction:	one student
		Duration:	5 seconds
3.	(begin 3:23) "Today we are going to practice our foul shooting. Now I want you to concentrate on fingertip control like this and — (teacher demonstrates and continues to talk about how to execute foul shot). "Does everyone understand how it's to be done?" — (teacher pauses 3 seconds — receives no reply — (end 4:01)	Function:	preparatory instructing
		Subscript:	does
		Mode:	talks and demonstrates
		Direction:	group or whole class
		Duration:	39 seconds
4.	(begin 4:02) "John will you please stop talking" — (end 4:04)	Function:	enforcing codes of behavior
		Subscript:	does
		Mode:	talks
		Direction:	one student
		Duration:	3 seconds

Later on in the period as the students are practicing foul shots —

5.	(begin 8:07) Teacher exclusively watches Jane shooting foul shots — (end 8:22)	Function:	Observing the performance of motor activities
		Subscript:	does
		Mode:	observes (silently)
		Direction:	one student
		Duration:	16 seconds
6.	(begin 8:23) As Jane is in the process of shooting a foul shot teacher says: "Spread your fingers further apart — that's it." (8:26)	Function:	concurrent instructing
		Subscript:	does
		Mode:	talks
		Direction:	one student
		Duration:	4 seconds
7.	(begin 8:26) Teacher turns, walks over to the window, and watches something going on outside (end 8:40)	Function:	other non-interactive interval
		Subscript:	(not coded)
		Mode:	(not coded)
		Direction:	(not coded)
		Duration:	14 seconds

Any descriptive system provides a limited account of reality. This one is no exception. In a fundamental sense, the description it produces is limited to the dimensions, categories, definitions and ground rules that comprise the system. A few of the more crucial limitations you should keep in mind as you read on are: (1) All non-interactive intervals and silent observation periods of less than 5 seconds are not accounted for — instead they are coded as part of the preceding interactive unit; (2) The system gives priority to interactive behavior and ignores concurrent non-interactive behavior. Thus, for example, when the teacher instructs a student and at the same time walks across the gym, his giving of instruction is coded but his walking is not; (3) While common professional terminology was used to name categories, those terms had to be precisely defined to be useful in the System. These precise definitions, in some cases, may not be congruent with your conception of the terms.

Application of The System: A Description of Teacher Behavior

The System was used to code 40 system II Data Bank videotapes comprised of 20 elementary and 20 secondary physical education classes. The grade levels represented in the elementary sample included first through sixth grade classes, while ninth through twelfth grade classes comprised the secondary sample. The total coded class time for the sample was 79,718 seconds or 1,328 minutes (710 minutes of elementary class time and 618 minutes of secondary class time). The average duration of the 40 class periods was approximately 33 minutes (elementary 35.5 minutes; secondary 30.8 minutes). Teacher behavior was coded from the moment each period officially began until the period ended.

How Teaching Time is Spent in the Gymnasium

Percent duration comparisons among behavior categories is presented in Figure 3.1. It can be seen that the teachers devoted over 94% of the total coded class time to performing *interactive functions* (categories 1-14).

They spent 76.6% of their time Preparing for, Guiding, and Observing the Motor Activities of students (categories 1-9), 23.4% of which involved Preparing for Motor Activities (categories 1-3), and 32.1% of which was devoted to Guiding the Performance of Motor Activities (categories 4-8).

The highest percentage of time spent in any single category was the 21.1% of class time teachers devoted to Observing Motor Activities. Although this represented a substantial amount of teaching time, it should be noted that this figure does *not* reflect the *full* amount of time devoted to observing behavior. Under the System ground rules, observing was coded only if the observation occurred *silently* for at least

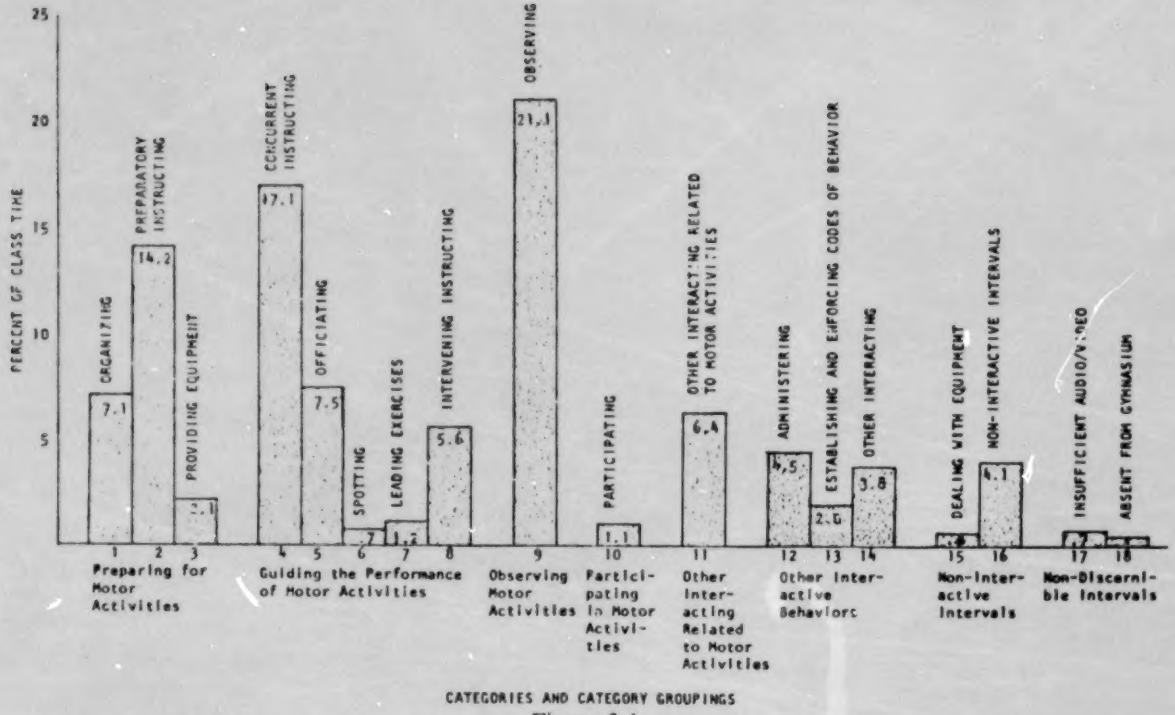


Figure 3.1
Teacher Time Devoted to Groups of Functions

five seconds, and if no other function was being carried out concurrently.

A separate analysis of the frequency of teacher behaviors revealed that Concurrent Instructing was the *most frequently* occurring teacher behavior (17.8%), followed by Observing (16.9%), and Officiating (14.1%). The rather broad definition of Officiating (this included stop and go signals provided by the teacher) contributed to its high percentage. Although these frequency measures are not particularly meaningful in and of themselves, they are significant when one considers the average amount of time teachers spend performing them. For example, Administering, which occurred relatively infrequently, lasted longer per occurrence (17.54 seconds) than any other interactive teacher behavior. Leading Exercises, which occurred 54 times, averaged 17 seconds per occurrence. The more frequently emitted teacher behaviors, which occurred for relatively longer time periods, were Preparatory Instructing (14.8 seconds), Organizing (13.22 seconds) and Observing (12.37 seconds).

The duration and frequency data clearly indicated that the gymnasium is a very busy, highly interactive educational setting. The teachers in this study averaged over six separate teacher behaviors (function dimension behaviors) per minute, averaging approximately 200 distinctive behavior shifts for each class period. The duration of these behavior units ranged from a fraction of a second to several minutes, with an average 9.9 seconds in length. Even such functions as Organizing, Preparatory Instructing, Leading Exercises, Observing, Administering and Other Interacting, which one might think would occur for relatively longer periods, in fact did not. The notion that teachers spend large blocks of uninterrupted time in Preparing, Guiding, and Observing Motor Activities in well ordered and well defined chronological blocks is simply not supported by the data. Whether planned or as a result of the circumstances of interaction endemic to teaching motor activities, teachers engaged in numerous and varying teacher behaviors of relatively short duration.

The often heard criticism that physical education teachers characteristically spend little class time attending to instructional pursuits is not supported by the results. Almost 37% of the total class time was devoted to the three Instructing categories. (See Figure 3.2, Group A). If one adds to this 16.9% of the class time devoted to what we have termed Instruction Related Behaviors (Group D) and the 21.2% Time devoted to Observing (Group B), the total percentage climbs to about 75% of total class time.

Thus far we have relied completely on the cumulative and central tendency measures of these data in reporting our results. We were especially aware of the importance of the variability measures (central measures can sometimes distort or misrepresent data), and their significance for providing an accurate and representative picture of the samples' characteristics. Table 3.3 summarizes some of the features of the samples variability.

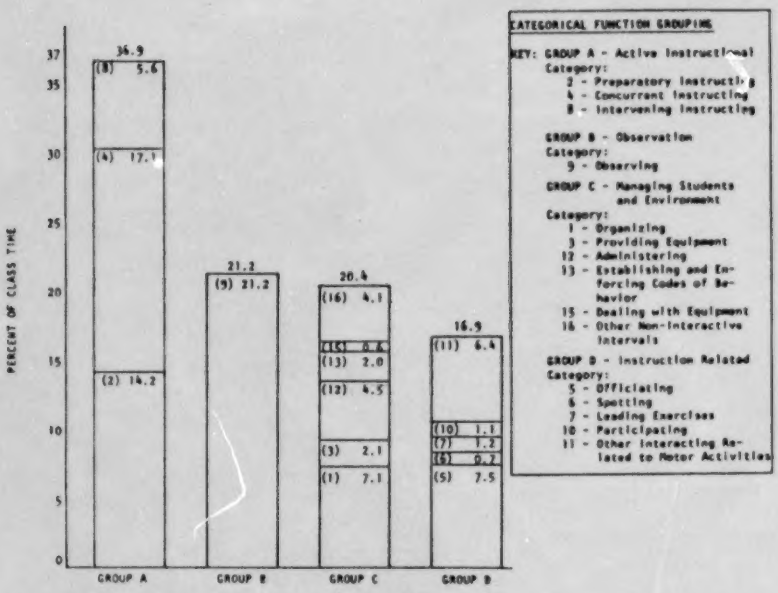


Figure 3.2
Percent of class time devoted to four categorical function groupings. (Category numbers in parentheses, with corresponding percent values; total group percent values above).

For example, the more frequent teaching behaviors, such as Preparatory Instructing, Concurrent Instructing and Officiating displayed high *duration* variability, while less frequently occurring categories such as Organizing, Intervening, Instructing and Observing were somewhat less variable in their *duration* from class to class. The less frequent teaching behaviors (Spotting, Leading Exercise, Participating, Dealing with Equipment) occurred in less than 25% of all classes.

On the other hand, all 40 teachers spent at least some percentage of class time in the three Instructing categories, while 20 devoted at least 30% of their time to these three teaching behaviors and 10 spent as much as 50% in these pursuits. Finally, 20 of the teachers devoted at least 19% of class time to Observing Motor Activities, while 10 spent more than 28% of their time Observing, with one teacher devoting 55% of class time Observing.

Elementary and Secondary Teaching Behavior

Many professionals have discussed at length the nature of teaching at the elementary and secondary levels. Some have suggested that teach-

ing at these two levels is essentially the same, while others have argued that teaching actions or behaviors at these levels were really quite different. There was little evidence in virtually all analytical areas provided for in the System to substantiate the notion that teachers at

Table 3.3
Variability, Percentile and Mean Measures
for Function Categories by Class

Function Number	Function Name	% Range	% Mean	% S.D.	Percentile Values in % of Class Time 25	50	75	100
1	Organizing	0.0-19.0	7.5	4.4	3.9	7.1	10.4	19.0
2	Preparatory Instructing	1.1-38.4	14.2	10.5	3.8	10.4	22.1	38.4
3	Providing Equipment	0.0-11.5	2.1	2.1	0.6	1.7	3.0	11.5
4	Concurrent Instructing	0.4-50.1	17.2	11.9	8.5	14.5	21.5	50.0
5	Officiating	0.0-25.3	8.0	8.9	1.1	3.5	16.0	25.3
6	Spotting	0.0-10.6	0.6	2.0	0.0	0.0	0.0	10.6
7	Leading Exercise	0.0-10.2	1.2	1.2	0.0	0.0	0.6	10.2
8	Intervening Instructing	0.2-22.5	5.7	5.1	1.5	4.1	7.9	22.5
9	Observation	0.4-55.2	20.5	13.5	9.0	19.0	27.7	55.2
10	Participating	0.0-15.2	1.1	3.3	0.0	0.0	0.0	15.2
11	Other Interacting Related to MA	1.2-15.5	6.1	3.6	3.2	5.6	7.0	15.5
12	Administering	0.0-27.9	4.7	5.1	1.2	3.0	6.6	27.9
13	Establishing & Enforcing Codes of Behavior	0.0-10.4	1.9	2.1	0.4	1.3	2.2	10.4
14	Other Interacting	0.5-18.7	3.6	3.3	1.3	2.3	4.3	18.7
15	**Dealing With Equipment**	0.0-3.5	0.5	0.8	0.0	0.0	0.8	3.5
16	**Other Non-Interactive Intervals**	0.0-13.2	3.8	3.4	1.0	2.6	6.0	13.7
17	**Insufficient Audio/Video**	0.0-11.1	0.7	1.8	0.0	0.0	0.7	11.1
18	**Absent From Gymnasium**	0.0-10.1	0.4	1.6	0.0	0.0	0.0	10.1

the elementary and secondary levels spend their teaching time very differently.

Figure 3.3 graphically compares percent duration characteristics of the two sub-samples. The amount of time the two groups of teachers spent in Preparing, Guiding, and Observing Motor Activities showed only small percentage differences. The elementary teachers spent a slightly greater proportion of their class time in the three Instructing categories (39% to 35%) while secondary teachers devoted a slightly larger proportion of their teaching time to Observing (22.7% to 19.2%). Proportional time spent in the other behaviors was also quite similar with the exception of Administering, in which secondary teachers devoted almost three times as much time as elementary teachers (6.8% to 2.5%). This was due, for the most part, to the way students arrived at the gymnasium. Students in elementary schools invariably arrived as a group with their classroom teachers, whereas secondary students arrived independently and thus had to be accounted for by the teacher.

Although Figure 3.3 displays only Function Dimension comparisons, it is instructive to note that the way in which elementary and secondary teachers carried out their behavior (subscript), the *mode* used in communication and the *direction* of that communication was remarkably similar. In addition, group comparison of the mean duration per occurrence also demonstrated their similarity. For example, the average time each group of teachers spent Observing and Organizing were within one second of each other, while the average duration per occurrence of Preparatory, Concurrent and Intervening Instructing was almost identical.

Teaching Behavior in Class Segments

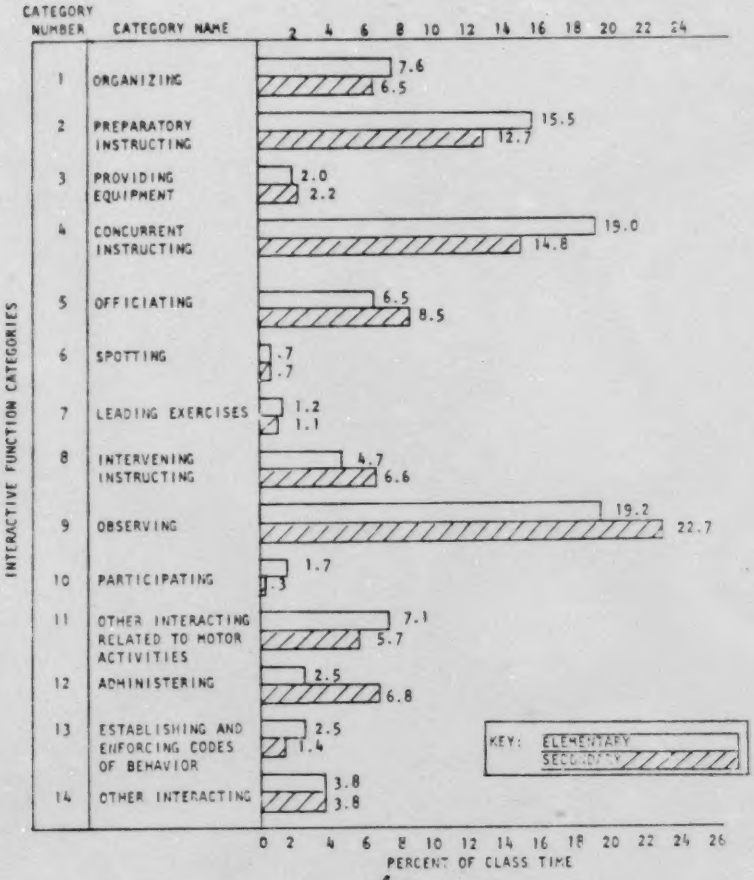
Teacher behavior was also analyzed with respect to variation as a function of quarters of the class period: beginning, early middle, late middle, and end quarters. The results of this analysis indicated that the amount of time spent by teachers in some behavior categories, especially those which occurred often, was somewhat different from class quarter to class quarter, while others were quite similar.

For example, totals for all the classes showed that Preparatory Instructing, Organizing and Leading Exercises, for the most part, steadily *declined* over the four class quarters. On the other hand, Officiating, Intervening Instructing, and Other Interacting Related to Motor Activities generally increased across quarters. Some behaviors such as Concurrent Instructing, Observing and Providing Equipment reached highs in either the second or third class quarters while behavior categories such as Administering and Other Interacting reached higher levels in the first and fourth quarters with accompanying lower levels occurring in the middle segments.

Although the results of our research do not support the notion of the occurrence of long segments of uninterrupted teaching behaviors, they

do tend to show a general pattern not unlike the hallmarks of what has come to be known as the traditional teaching model. When we looked at the cumulative characteristics of teacher behavior across class time, we found for example, that Organizing, Administering and Preparatory Instructing reached their highest levels in the first quarter of the classes, while Concurrent Instructing, Observing and Officiating were most prominent in the middle quarters of the class periods. Furthermore, Intervening Instructing and Other Interacting Related to Motor

Figure 3.3
Elementary and secondary comparisons of class time devoted to 14 Interactive function categories


CATEGORY NUMBER
CATEGORY NAME
2 4 6 8 10 12 14 16 18 20 22 24
INTERACTIVE FUNCTION CATEGORIES
1 ORGANIZING 7.6 6.5
2 PREPARATORY INSTRUCTING 15.5 12.7
3 PROVIDING EQUIPMENT 2.0 2.2
4 CONCURRENT INSTRUCTING 19.0 14.8
5 OFFICIATING 6.5 8.5
6 SPOTTING .7 .7
7 LEADING EXERCISES 1.2 1.1
8 INTERVENING INSTRUCTING 4.7 6.6
9 OBSERVING 19.2 22.7
10 PARTICIPATING 1.7 .3
11 OTHER INTERACTING RELATED TO MOTOR ACTIVITIES 7.1 5.7
12 ADMINISTERING 2.5 6.8
13 ESTABLISHING AND ENFORCING CODES OF BEHAVIOR 2.5 1.4
14 OTHER INTERACTING 3.8 3.8
KEY: ELEMENTARY SECONDARY
0 2 4 6 8 10 12 14 16 18 20 22 24 26
PERCENT OF CLASS TIME

Activities occurred for greater proportions of class time in the second half of the classes. There are similarities between these findings and the elements of the traditional model of teaching.

Subscript, Mode, and Direction of Teacher Behavior

When teachers interact with students for the purpose of accomplishing what we have termed function dimension behaviors, the nature of that interaction is partially determined by *who* (subscript) carries out the function, *how* (mode) it is communicated or accomplished, and *to whom* (direction) these behaviors are directed.

Subscript. Of the total 8,048 units of teacher behavior coded in the function dimension almost 77% were carried out solely by the teacher (subscript category 1 — Does), while approximately 16% were in category 2, Shares and only 1.4% in category 3 — Delegates.

The extent to which teachers *did, shared* or *delegated* the functions varied considerably depending on which function was being carried out. For example, 95.3% of the Concurrent Instructing behaviors were exclusively carried out by the teachers, while 76.5% of the Intervening Instructing and 75.1% of the Preparatory Instructing behaviors were either shared with or delegated to students.

Mode. Perhaps the most significant feature of the mode results was the overwhelming frequency with which *Talk* was utilized as either an exclusive mode or in combination with other mode categories. The teachers used *Talk* as an exclusive mode in approximately 45% of the 8,048 separate units of teaching behavior, while *Talk* in combination with other mode categories occurred in an additional 35% of the coded units. (Talk was used as an exclusive mode in more than 50% of the units of behavior in eight of the 14 interactive categories.) For example, 79% of the Concurrent Instructing behaviors involved Talks as an exclusive mode, as were 75% of the Organizing Behaviors. It should be noted that *Listens* (mode category 2) almost never occurred as an exclusive mode and on the average, teacher demonstration occurred slightly less than six times per class period.

Although numerous points may be made about these data, one is particularly important with respect to the characteristics in the nature of the verbal flow within different behavior categories. In the less formal nonpedogogical categories like Other Interacting Related to Motor Activities, and Other Interacting, the verbal flow (talking and listening behavior of the teacher) was largely a two-way interaction. Yet in the three Instructing categories (2, 4, and 8), this two-way flow diminished sharply to a more predominant one-way flow, teacher speaks — student(s) listen(s).

Direction. These data show that a large percentage of the teacher behaviors (30%) were directed exclusively toward *One Student* and an even larger percentage (38%) exclusively directed toward a *Group/ Whole Class.* Perhaps the most significant aspect of the data revolves

around the three Instructing Categories. Sixty percent of the Preparatory Instructing behaviors were directed at a Group/Whole Class of students (direction category 2), while only 29% were directed toward One Student (category 1). However, the direction of Concurrent and Intervening Instructing was quite different with 51% and 67%, respectively, of these instructing behaviors directed at One Student and only 33% and 24% respectively, to the Group/Whole Class of students.

Summary

At the risk of oversimplifying the results, let us try our hand at drawing a composite picture of the physical education teachers we studied. Physical education teachers were highly interactive, clearly devoting considerably large portions of class time to instruction. In addition, they seemed to spend substantial percentages of their teaching time simply *silently observing* the motor activity of students. Their behavior was somewhat variable across class segments, with some evidence that these behaviors were quite similar to those associated with a traditional model of teaching. As a rule, teachers did not spend long periods of time performing uninterrupted functions, but rather continuously shifted from one behavior to another seemingly attempting to keep up with the needs of the students and demands of the learning environment in a reactive or reflexive sense. The physical education teachers were doers and talkers, it is as simple as that. Teachers were dominant in carrying out and communicating their teaching intentions. In most instances, they initiated and solely carried out teaching actions, while students only infrequently shared or were delegated this responsibility.

Talk was the overwhelming mode of communication and was employed as an *exclusive* mode in about one-half of the teacher-student interactions, while occurring in combination with other modes in 85 percent of the interactions. Students seldom initiated verbal interaction, and the teachers did most of the talking, while students did most of the listening. Dialogue about the substance of the lesson (the type of dialogue one might expect in a guided discovery or problem solving teaching approach) was conspicuously absent and teachers seldom redirected questions to students. Written materials were almost *never* used and the evidence of teaching aids was negligible.

In addition, teacher demonstration occurred only 238 times (about six per class), while the teachers used other students to demonstrate a total of only six times. The popular conception that physical education teachers employ skill demonstration, performed by either teacher or student, as an extensive mode through which they communicate instruction information, does not seem to be supported by our findings.

Finally, it is evident from our results that the teachers tended to engage in Preparatory Instructing with large groups of students (possibly based on concept of instructional efficiency), while perceiving

Concurrent and Intervening Instructing as teaching actions more appropriately directed toward individuals, based on their perceptions of the individualized need of students.

One Final Perspective

Regardless of the selectivity of the presentation of results and the perspective implicit in the discussion of findings, one paramount factor consistently seems to emerge from the often tedious and frustrating enterprise which we call descriptive research on teaching. If anything is obvious about the practice of teaching physical education it is the magnificent complexity of teaching itself. When one begins to recognize and appreciate the diversity and variability of teacher behavior as viewed through the limited focus of just one observational system, one quickly develops a healthy respect for the teaching act not often cultivated through the *casual* observation of teaching. This factor cannot be emphasized enough as you contemplate what you have just read.

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Chapter Four

Teacher-Student Interaction

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VICTOR H. MANCINI

Descriptive analytical research involving interaction analysis has become increasingly popular with educators over the past three decades, but until recently it has received little attention from physical educators. Interaction analysis (IA) is an attempt to systematically record spontaneous classroom behaviors and teacher-pupil interaction with a minimum of observer bias.

There are many uses of interaction analysis. An IA observation instrument can be used to 1) describe current classroom practices, 2) modify teacher behavior, 3) provide a tool for the analysis of teaching, 4) give feedback about one's own teaching, 5) train student teachers, 6) discriminate between patterns of teaching, 7) determine the relationships between various classroom behaviors and student growth, and 8) help in projecting future teaching patterns (Batchelder and Cheffers, 1976).

The most widely used observation instrument has been the Flanders Interaction Analysis System (FIAS). It can be learned in less than twenty hours and emphasizes both the affective and the cognitive domain in the classroom.

The Descriptive System

There have been many modifications of FIAS, developed in order to increase its sensitivity or usefulness in various situations. The instrument which was used to code the tapes described in this chapter is CAFIAS (Cheffers Adaptation of the Flanders Interaction Analysis System).

Special Features of the System

The CAFIAS provided a device for coding of nonverbal behavior through a double category system, so that any behavior could be categorized as verbal, nonverbal, or both verbal and nonverbal. Systematic observation of physical education classes as well as more sensitive observations in classroom situations was then possible. The system is presented in Table 4.1.

CAFIAS permitted the coding of the class as 1) a whole, where the entire class is functioning as one unit, 2) part, where the class is broken down into small groups or the students are working individually, or 3)

independent, with no teacher influence, where there is no observable class teacher present. This is accomplished by the technique of placing a W, P, or I beside each tally when the structure of the class changes. This makes it possible to have a time analysis of the class structure, as well as percentages of each class structure for comparative purposes. Table 4.2 summarizes thirty-two parameters about which CAFIAS provides data.

TABLE 4.1
THE CATEGORIES OF CAFIAS

2-12 Through 7-17 Teacher Behavior
8-18 Through 9-19 Student Behavior
10 Confusion
20 Silence

Categories	Verbal	Nonverbal
2 - 12	2 (A positive value assessment) Praises, commends, jokes, encourages.	12 Face: Smiles, nods with smile, (energetic) winks, laughs. Posture: Applause through clapping hands, congratulatory pats on shoulder, head, etc., rings student's hand, embraces joyfully, laughs to encourage.
3 - 13	3 (No value implied) Accepts, clarifies, uses, and develops suggestions and feelings by the learner. N. B. Flanders category one which refers to teacher acceptance of student feeling and emotions is included in this category. Coders are reminded to use I and II on the tally sheets. These behaviors are tallied separately for analysis purposes and included for parameter purposes in the matrix as 3's and 13's.	13 (Elevates student performance onto a par with teacher performance) Face: Nods without smiling, tilts head in emphathetic reflection, sighs emphathetically. Posture: Shakes hands, embraces sympathetically, places arm around shoulder or waist, catches an implement thrown by student, accepts facilitation from students, takes part in game with students, supports child during activity, spotting in gymnastics.
4 - 14	4 Asks questions requiring student answer.	14 Face: Wrinkles brow, opens mouth, turns head with quizzical look. Posture: Places hands in air quizzically to expect answer, stares awaiting answer, scratches head, cups hand to ear, stands still half-turned toward person, awaits answer.
5 - 15	5 Gives facts, opinions, expresses ideas or asks rhetorical questions.	15 Face: Whispers words inaudibly, sings or whistles. Posture: Gesticulates, draws, writes, demonstrates activities, paints.
6 - 16	6 Gives direction or orders which will result in immediate observable student response.	16 Face: Points with head, beckons with head, yells at using language other than recognizable words. Posture: Points finger, blows whistle, holds body erect while barking commands, pushes a child in a given direction.
7 - 17	7 (A negative value assessment.) Criticizes, expresses anger or distrust, sarcastic or extreme self-reference.	17 Face: Grimaces, growls, frowns, drops head, throws head back in derisive laughter, rolls eyes, bites, spits, butts with head, shakes head. Posture: Hits, pushes away, pinches, grapples with, pushes hands at student, drops hands in disgust, bangs table, damages equipment, throw things down.

Table 4.1 (continued)

Categories	Verbal	Nonverbal
8 - 18	8 Student response that is entirely predictable, such as obedience to orders and responses not requiring thinking beyond the comprehension phase or knowledge (after Bloom).	18 Face: Poker-face response, nods, shakes, gives small grunts, quick smile. Posture: Moves mechanically to questions or directions, responds to any action with minimal nervous activity, robot-like, practices drills, awaits in line, etc., student responds by putting hand up in answering to teacher direction.
8½ - 18½	Eine (8½) Predictable student responses that require some measure of evaluation, synthesis, and interpretation from the student but must remain within the province of predictability. The initial behavior was in response to teacher initiation. Student interpretation from teacher in discussed activity. A student questioning when related strictly to topic under discussion.	Eineteen (18½) Face: Look of thinking eyes, pensive formal expressions. Posture: Interprets movements, tries to show some arrangement that requires interpretive thinking; e.g. works on gymnastic routine, test taking, interpretation of task cards, all game playing. Student puts hands in air in order to give answer to teacher question.
9 - 19	9 Pupil-initiated talk that is purely the result of their own initiative and which could not be predicted (either positive or negative behavior).	19 Face: Makes interrupting sounds, gasps, sighs. Posture: Puts hands up in air to ask (unsolicited) question of teacher, gets up and walks around without provocation, begins creative movement education, makes up own games, makes up own movements, shows initiative in supportive movement, introduces new movements into games not predictable in the rules of the games.
10 - 20	10 Stands for confusion, chaos, disorder, noise.	20 Face: Silence, children sitting doing nothing, noiselessly awaiting teacher just prior to teacher entry, etc.

Table 4.2
Major CAFIAS Parameters

Major Parameters of CAFIAS	statistic	Major Parameters of CAFIAS	Statistic
Teacher contribution, verbal	%	Pupil initiation, verbal (Student suggestion)	Ratio
Teacher contribution, nonverbal	%	Pupil initiation, nonverbal (Student suggestion)	Ratio
Total teacher contribution	%	Pupil initiation, total (Student suggestion)	Ratio
Student contribution, verbal	%	Content emphasis (teacher in-put)	Ratio
Student contribution, nonverbal	%	Teacher (as teacher)	%
Total student contribution	%	Other students (as teacher)	%
Silence	%	The environment (as teacher)	%
Confusion	%	Verbal emphasis	%
Total silence and/or confusion	%	Nonverbal emphasis	%
Teacher use of questioning, verbal	Ratio	Class structure (as one unit)	%
Teacher use of questioning, nonverbal	Ratio	Class structure (group or individualized)	%
Teacher use of questioning, total	Ratio	Class structure (no teacher influence)	%
Teacher acceptance and praise, verbal	Ratio	Teacher empathy to student emotions	Freq. count
Teacher acceptance and praise, nonverbal	Ratio		
Teacher acceptance and praise, total	Ratio		
Pupil initiation, verbal (Teacher suggestion)	Ratio		
Pupil initiation, nonverbal (Teacher suggestion)	Ratio		
Pupil initiation, total (Teacher suggestion)	Ratio		

Identification of the agency responsible for performing the teaching function was provided, since the classroom teacher is only one of the agents responsible for providing the teaching stimulus. Peers, and structures within the local environment, are critical factors which have

often been overlooked in the general assessment of teaching. Based on the philosophy that when learning occurs, teaching has taken place, CAFIAS, through postscripting, permits the classification of the teaching agency as 1) class teacher, 2) other students, or 3) the local environment.

While CAFIAS was designed for use in physical education classes, its expansion of the FIAS categories, as outlined in Table 4.1, has meant that it can also be used to present a clearer and more sensitive picture of the teaching-learning process in academic classes. Due to this, and to the fact that it is a valid and reliable instrument (Cheffers, 1972), it has been used in several ways in the six years since its development. (A chart at the end of this chapter provides a listing.)

Coding Procedures

In gathering data using CAFIAS, coders record numerical symbols of the observed behaviors in order of occurrence. This is sometimes referred to as "Spontaneous Event Recording." The recorder will code all behaviors that are observable, but a time limitation is placed at three seconds if extended behaviors are taking place.

An example of the use of CAFIAS is presented in Table 4.3. An interactive episode is presented along with comments interpreting the categorization.

Table 4.3
Illustration of Use of CAFIAS

Episode — Illustrating Categories 9, 7-2, 8 of CAFIAS			
Teacher	Enters gymnasium. Children are working together building a pyramid.		19
	Teacher watches for 30 seconds.	(Ten)	
Teacher	"Good try, boys, but you will find it easier		2
	if you place 4 boys		7
	at its base instead of three.		2
	Would you like to try that?"		4
One Child	"Yes.		8
(Bob)	but what if we counterbalance with 3 boys to the right side?"		8 \
Teacher	"Interesting thought, Bob."		2
	Teacher frowns, shakes head		17
	"No, Bob, it won't work because		2
	you are not really counterbalancing.		7
	But you were nearly at the solution		2
	with the first base you tried."		2
	(Puts hand on shoulder of Bob whose suggestion it was.)		12
(Bob)	"Let's try that first base again, gang."		8 \

Comments

The boys had initiated the activity without teacher direction; hence their actions are recorded as 9's or 19's. Even if the teacher had made the suggestion during the previous lesson, there is no way of telling this, so it can be assumed that the boys initiated the activity. Obviously the teacher's reaction was not punitive; he corrected Bob's answer, and yet was careful to praise at the same time. (7-2)

The presence of 8 \'s indicate student interpretive activity resulting from initial teacher suggestion.

Application of the System: Teacher-Student Interaction

The sample coded using CAFIAS consisted of all 83 Data Bank videotapes. (Characteristics of the sample are presented in Chapter One.) Start and finish positions on each tape were predetermined. Each tape contained a range of 30-50 minutes of tangible work duration. Preliminary and post-class activities were discounted. The tapes were coded using five recorders whose inter-rater reliability coefficients ranged between .90 and .94. The results are presented in three major components: use of CAFIAS categories; major CAFIAS parameters, in percentages and ratios; and patterns of interaction between teachers and students, and among students.

Use of CAFIAS Categories

The mean percentages of CAFIAS category usage for male and female teachers in elementary and secondary schools is presented in Figure 4.1. Analysis is divided into categories for teachers, for students, and for a nonpersonal category relating to silence and confusion.

The patterns of category usage for male and female elementary and secondary teachers and students were remarkably similar. The only exceptions were that secondary students played more games (using the nonverbal 18\ category), and that elementary students tended to engage in more drills or activities (using the nonverbal 18 category) where narrow influence on the teacher influence was in evidence. Male elementary teachers tended to give more verbal information, whereas female elementary teachers were a little more nonverbal in giving directions.

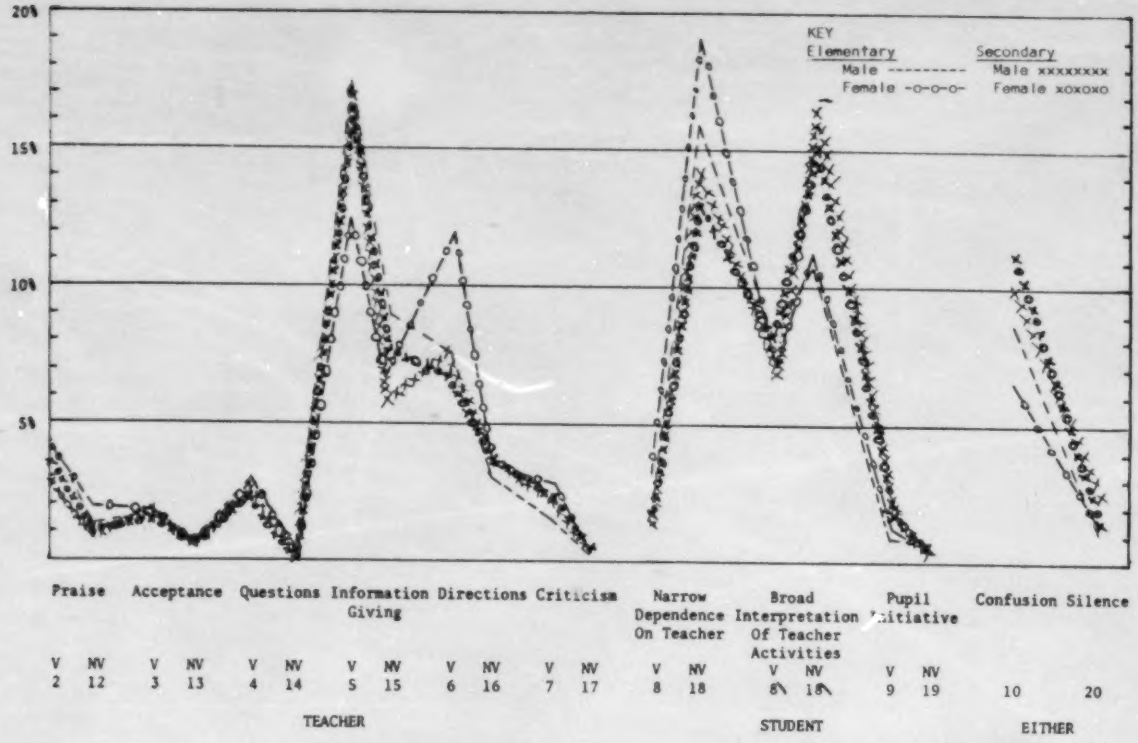
The predominant teaching behaviors were lectures, information giving, and giving directions to the children. As compared to all behaviors coded, very little teacher praise, acceptance of students' feelings and ideas, teacher questioning or teacher constructive criticism occurred — for that matter, very little criticism of any variety was evidenced in the teacher behaviors.

Major CAFIAS Parameters

Some of the parameters listed in Table 4.2 were used to reduce the data. Findings pertinent to selected parameters are presented below.

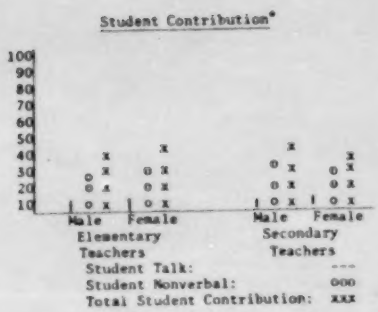
Verbal and Nonverbal Contribution. The percentage distribution of verbal, nonverbal and total contribution of teachers and students is presented as Figure 4.2. The percentage of teacher contribution was similar for all comparisons. Remarkably low percentages for nonverbal behaviors were recorded for all teachers. Student behaviors fell predominantly into the nonverbal dimension, and a higher than normal ratio of overall student output was recorded. In general, the ratio of teacher contribution to student contribution was established at 2:1 by

Figure 4.1
Mean percent of behaviors in each CAFIAS category.

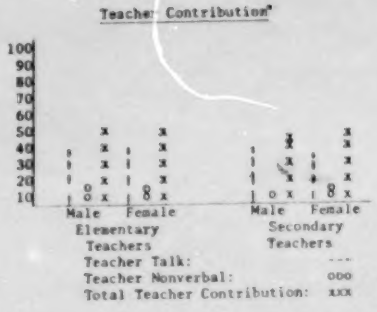


Flanders. A similar ratio was not achieved in this study, since teachers made less of a contribution to the overall matrix of behaviors than Flanders' norms would lead us to expect.

Figure 4.2
Percent of verbal and nonverbal contributions made by teachers and students.



*The percentages of student behaviors recorded during the observed period.



*The percentage of verbal and nonverbal behaviors made by the teacher during the observed period.

Questioning. In the sample observed, it is significant to note that very few questions were asked of the children. None of the teachers used questions which were related to the lesson content, and frequency of teacher questioning was similar across sex and grade.

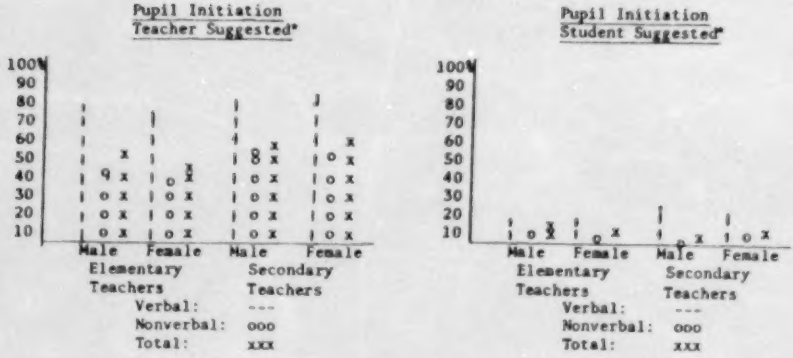
Acceptance/Praise: Direction giving/Criticism. The ratio between teacher acceptance/praise and teacher direction giving/criticism is sometimes referred to as the "little ID ratio". Interestingly, male elementary teachers recorded a slightly higher little ID ratio than female elementary teachers, and this difference was reversed for the male secondary and female secondary teachers. Great importance cannot be attached to these ratios, however, because of the low number of behaviors recorded.

Pupil Initiative. Figure 4.3a presents data pertinent to pupil initiative that is pupil directed or initiated with teacher stimulation, and Figure 4.3b presents data on pupil initiative which has no immediate teacher inducement. For the former, it should be noted that secondary school ratios are slightly higher than elementary school ratios, and due to the very high proportion of student interpretive activity (the 8\ and 18\ cells), the amount of teacher induced pupil initiative is high throughout. In 4.3b, which deals with pupil initiative that has no immediate teacher inducement, the overall ratios are very low. There appears to be a little more emphasis on the verbal dimension among secondary students than among elementary students, and no differences between classes taught by male and female teachers were identified.

Lesson Content. The findings indicate that there was more teacher emphasis on content among elementary males than females, while students in secondary schools reflected more emphasis on content than did students in elementary schools.

Verbal and nonverbal behaviors. The observations clearly indicate that the physical education teachers consistently emphasize verbal rather than nonverbal behaviors. In view of the accredited emphasis of teacher verbal behaviors, it is clear that teachers rely on the verbal medium a good deal more than perhaps we had realized, especially considering the nonverbal nature of physical education content.

Figure 4.3
Ratio of pupil initiated behaviors:
teacher suggested and student suggested.



*The ratio of students' initiated behaviors (as a result of teacher suggestion) to unsolicited behaviors.

*The ratio of student initiated behaviors to all other student behaviors.

Teaching agency. As noted previously, the teaching agency can be classified as the class teacher, other students, or the environment. The results clearly indicate that the main teaching agency in the sample was the class teacher, with very little diversification of the teaching agency throughout. In addition, results across the variables of sex and grade revealed no differences.

Class structure. Class structure may be classified as: students working in one group; students working as individuals or in small groups; or students working without observable teacher influence. Elementary classes, especially with male teachers, worked as one unit. Secondary classes utilized more group or individual class structures, but the predominant organizations across all classes was that of the whole group working as one unit. In addition, the incidence of no observable teacher influence was very low.

Sympathetic-empathetic behavior. In the sample observed, the use of sympathetic-empathetic behavior was almost nonexistent (less than 1% in all cases, with a range from .03% to .09%). In addition, no differences by sex and grade were detected in the use of these behaviors.

Patterns of Interaction.

The use of a matrix permits succinct and objective descriptions of the patterns of interaction in each class. Table 4.4 outlines and describes the significant interaction patterns observed during the lessons.

Table 4.4
Patterns of Interaction

Elementary		Secondary	
Male	Female	Male	Female
(1) 5-5-8-5-6-6-8 (2) 8\-10-8\	(1) 5-5-6-8-6 (2) 8\-8\-10-8\-5	8\-10-8\-8\ 5-5-6-8-6	8\-10-8\-8\- 5-5-6-8-6
What Do These Patterns Mean?			
(1) Extended teacher information giving and demonstration, followed by narrow student response, leading to more teacher information giving, to extended teacher direction giving and more narrow student response. (2) Students playing games with other students.	(1) Extended teacher information giving, followed by narrow student response, followed by more teacher directions. (2) Extended drills, followed by extended games, followed by teacher information giving.	Games being played on an extended note, followed by extended teacher information giving, then teacher directions, narrow student response, followed by more teacher directions.	

The patterns observed in the elementary classes were remarkably similar, and reflect a predominance of teacher information giving along with directions and predictable student responses; there was little student initiation. When student initiation was evident, it tended to take place among students, not between students and teacher(s). At all times, however, the student behaviors occurred as a result of initial teacher suggestion.

In the secondary lessons, teacher emphasis on information giving, directing and student predictable responses again predominated. Direct connection with student extended skill practice or game practice was detected. Again, student behavior resulted from initial teacher suggestion.

The primary teaching patterns of secondary male and female teachers were identical. A disappointing factor of all behaviors observed was the absence of teacher praise and acceptance, and genuine student initiated activity.

Summary of Results

(1) Minimal differences were detected in category usage, interaction parameters or in interaction patterns between male and female teachers and between elementary and secondary teachers.

(2) Teachers used lecture, demonstration, and direction giving as their overwhelmingly predominant mode of teaching.

(3) By comparison with the total recorded teacher behaviors, virtually no acceptance of student feelings and ideas, praise or questioning behaviors were recorded by the sample teachers.

(4) Punishment and correction of student behaviors was minimal.

(5) Virtually no genuine student initiated activity was recorded in the sample classes.

(6) Teacher-student contribution norms of 2:1 (Flanders, 1970) were not achieved in the sample. The students contributed more, bringing the ratio to something like 3:2, with student contribution predominantly nonverbal.

Discussion and Implications

Perhaps the most positive feature of the analysis of the 83 tapes was the finding that the teacher-student observable behavior ratio produced a different result from that of Flanders (gathered from classroom setting). Teachers contributed less and students contributed more, than one would have supposed if Flanders' norms were operative. Even though student behaviors were predominantly nonverbal, there is an indication that the accent on participation was greater in the physical activity classes than it is in more sedentary subject area classrooms.

If this is true, then much of the justification for the inclusion of physical education as an essential curriculum activity is supported. From the data provided, however, a number of serious questions arise which may not be considered entirely positive.

(1) If male and female teachers differ so little in teaching procedures, why are coeducational classes so long in achieving normal status?

(2) If the teaching process behaviors, interaction patterns, and other CAFIAS parameters yield such similar results across elementary and secondary teachers, why do we persist in offering such college courses as elementary methods and secondary methods? Indeed, whole college departments have been set around the assumption that secondary and elementary teachers need separate preparation. Perhaps a case can be made for different curricula, different developmental growth periods, and varying psycho-social needs, but the end result is that elementary and secondary physical education teachers adopt remarkably similar behaviors, teaching patterns, modes of teaching, class structures and emphases on content. Does this support the claim that many educators make preferring separate level teacher preparation?

(3) In an era which consistently emphasizes humanism in educational processes, why do physical educators overwhelmingly adopt direct, traditional teaching behaviors such as lecture, demonstration, and direction giving? Such humanistic activities as acceptance of students feelings and ideas, using praise and encouragement, and using questions to stimulate student thought were singularly lacking from the sample teachers in this study.

(4) If today we insist that education be geared toward developing student initiative and responsible independence, why are these behaviors in such scant evidence in the sample lessons?

(5) If knowledge of results and positive feedback are necessary for student learning, why is constructive criticism and praise not a feature of the sample? Not one of the sample teachers evidenced high incidence of these two helpful teaching behaviors.

(6) If variety in teaching is desirable, why is there so little evidence of the use of the environment as an agency for instruction or the use of other students in a teaching capacity in the classes observed?

Answers to these questions, of course, will take many years of thorough experimental investigation, but immediate shifts in college, school, professional, local emphasis are probably warranted.

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APPENDIX I
CAFIAS RESEARCH 1972-1978

RESEARCHERS	CAFIAS HAS BEEN USED TO DESCRIBE:	YR. OF COMPLETION OR PUBLICATION
Mancini, Cheffers, and Zaichkowsky	(1) interaction patterns of students and teachers in different decision making situations	1976
Batchelder	(2) comparisons of predictive estimates of classroom process behaviors in math, English, and physical education classes	1975
Evsal	(3) comparisons of open and traditional classrooms	1976
Travis	(4) comparisons of teaching patterns of liberal arts tutors in different experimental circumstances	1977
Bechtold	(5) relationships between volunteer high school students and moderately retarded high school students in physical education programs	1976
Cohen	(6) interaction measures between therapists and clients	1976
Martinek, Chertok, Lydon	(7) effects of varying teacher models on the development of motor skills and self concepts	1977, 1975, 1978
Pratt & Owen, Doenges	(8) elementary children as modifiers of teacher behavior	1973, 1976
Cheffers, Batchelder, and Zaichkowsky	(9) the effects of movement on improving ethnic relationships	1976
Cheffers & Mancini	(10) high risk programs for teacher training in psychological education	1975
Kielty, Hendrickson, Mancini, Morris & Fisher; Vogel, Rochester, Mancini & Morris, & Getty	(11) the effect of interaction analysis on the preparation of student teachers	1975, 1976, 1976, 1977, 1977
Keane	(12) comparisons of sex differences in teachers' leadership styles	1976
Mawdsley	(13) comparisons between educators teaching of normal and atypical children in physical education classes	1977
Durkin, Wood	(14) critical evaluations during residential field experiences for middle school children (Durkin) and urban children (Wood)	1977, 1977
O'Donnell	(15) comparisons of various group learning experiences in college freshman history classes	1977
Faulkner	(16) comparisons of male and female pre-service teaching behaviors	1976
Agnew, Mason	(17) comparisons of male and female teaching and coaching behaviors	1977, 1977
Batchelder & Keane	(18) analysis of college lecturing	1977

Chapter Five

Augmented Feedback

SYLVIA FISHMAN
CHARLES TOBEY

In physical education classes the teacher has many opportunities to observe performance and to react to the appropriateness or inappropriateness of a student's responses to instruction. Consequently, the physical educator can design his/her instructional behavior with reference to the evidence of student learning available from a student's previous performance. The term augmented feedback is frequently used to identify instructional behavior contingent upon a student's response. Ample evidence is available in the literature to support the critical relationship between the presence or absence of augmented feedback and the acquisition of motor skills. For example, according to Bilodeau and Bilodeau (1961),

> . . . studies of feedback show it to be the strongest, most important variable controlling performance and learning. The results of studies have repeatedly demonstrated that there is no improvement in performance without feedback, and a deterioration in performance when feedback is withdrawn (p. 250).

Since opportunities for a teacher to provide augmented feedback occur frequently in physical education classes, and since there is evidence to support the significant relationship between augmented feedback and motor skill learning, a system for recording how teachers provide augmented feedback in physical education classes was developed (Fishman, 1974). In a follow-up study, Tobey (1974) used the system to code the Data Bank tapes. He was interested in finding the answers to questions such as: How often do teachers give feedback? To what extent is the feedback individualized? How specific is the feedback, and to what aspects of the movement does it refer? How is the feedback timed in relation to the students' performance of the movement? Does the feedback tend to be positive, negative, or neutral? This chapter reports on both the development of the system and the results of Tobey's (1974) study.

System Development

A number of steps led to the development of the system. These steps are reported in detail in Fishman (1974). Following a review of relevant literature in motor learning and descriptive analytic research on teaching, a series of decisions were made with regard to the actual system.

The focus of the system was restricted to augmented feedback, defined as: *a teaching behavior dependent upon the motor response of one or more students and intended to provide information related to the acquisition or performance of a motor skill.* A category system format, using an analytic unit, with two frames of reference, intent or motive of the teacher and objective characteristics of the behavior, was developed for the purpose of recording augmented feedback in secondary physical education classes in which motor skills related to team, dual, individual sports and dance were being taught.

After preliminary decisions were made, categories were developed by assigning a label to a single behavioral event or group of related events. The principal concern was to develop a set of mutually exclusive categories and sub-categories which reflected research evidence and theory, and which described events occurring in the gymnasium. The final form of the original system included six categories of augmented feedback: Form, Direction, Time, Teacher Intent, the General Referent, and the Specific Referent. Within these categories, subcategories representing codable behaviors were identified. Category definitions for the system are presented in Table 5.1.

Table 5.1
System Categories, Sub-Categories and Definitions

The Methodological Dimension

1. Form: The category identifying the way feedback is provided.
   a. Auditory Feedback: Feedback provided orally.
   b. Auditory-Tactile Feedback: Feedback provided orally and by manual assistance.
   c. Auditory-Visual Feedback: Feedback provided orally and by teacher demonstration.
2. Direction: The category identifying to whom feedback is provided.
   a. A Single Student: Feedback directed to only one student, although it may be seen or heard by other students in the class.
   b. A Group of Students: Feedback directed to more than one student but less than all students, although it may be seen or heard by all students in the class.
   c. All Students in the Class: Feedback directed to the entire class.
3. Time: The category identifying when feedback is provided.
   a. Concurrent Feedback: Feedback provided during the performance of a motor skill.
   b. Terminal Feedback: Feedback provided some time after the performance of a motor skill.
   c. Delayed Feedback*: Feedback provided after the performance of a motor skill and after the student has actively participated in one or more intervening motor skill activities.

The Substantive Dimension

4. Teacher Intent: The category identifying the purpose of the feedback.
   a. Evaluative Feedback: Feedback intended to provide an appraisal of the performance of a motor skill.
   b. Descriptive Feedback: Feedback intended to provide an account of the performance of a motor skill.
   c. Comparative Feedback: Feedback intended to provide an analogy related to the performance of a motor skill.
   d. Prescriptive Feedback: Feedback intended to provide instruction for the subsequent performance of a motor skill.

e. Affective Feedback: Feedback intended to provide an attitudinal or motivational set toward the performance of a motor skill.

5. The General Referent: The category identifying the quantity of the movement referred to in the feedback.
   a. The Whole Movement: Feedback provided about multiple components in the performance of a motor skill.
   b. Part of the Movement: Feedback provided about one component other than the outcome or goal of the performance of a motor skill.
   c. Outcome or Goal of the Movement: Feedback provided about the result of the performance of a motor skill.
6. The Specific Referent: The category identifying the quality of the movement referred to in the feedback.
   a. Rate: Feedback provided about the time or duration of the movement involved in the performance of a motor skill.
   b. Force: Feedback provided about the strength or power expended in the performance of a motor skill.
   c. Space: Feedback provided about the direction, level or magnitude of the movement involved in the performance of a motor skill.
   d. Non-Specified Specific Referent: Feedback provided without direct reference to the rate, force or space of the movement involved in the performance of a motor skill.
7. Positive/Negative Character*: The category identifying the positive/negative character of the feedback.
   a. Positive Feedback*: Feedback that either praises the individual or reinforces a correct movement.
   b. Negative Feedback*: Feedback that points out the fact that an individual is doing something incorrectly.
   c. Neutral Feedback*: Feedback that neither praises or encourages nor criticizes or corrects.

*Categories/Sub-categories added by Tobey (1974) to Fishman's (1974) original system.

Since high levels of validity, objectivity (level of complete agreement, 90.34%) and reliability (self-agreement level of 91.98%) were attained, it seemed reasonable to conclude that with only minor revisions, this system had potential value as a research tool and as a tool for effectively describing "real world" events. The final form of the original system is described in detail in Fishman (1974).

Tobey (1974) revised Fishman's original system for the purpose of developing a system that would, among other things, record additional dimensions of augmented feedback. Two revisions, based on recommendations by Fishman, were to eliminate the Explicative Feedback sub-category and to revise the Outcome or Goal of the Movement sub-category. Tobey also made three additions to the system: 1) a Delayed Feedback sub-category, 2) a Positive/Negative Character category, and 3) a record of the skill being taught and whether students were practicing, competing or doing both.

The Descriptive System

Operational definitions of the dimensions, categories and sub-categories of the revised system appear in Table 5.1. *Dimensions* identify the mode and content of the feedback. *Categories* identify the

characteristics of the feedback. *Sub-categories* identify the codable components of each of the categories of feedback. In using the revised form of the system the tape is stopped when a unit of feedback is observed and the unit is coded as to its form, direction, time, intent, general referent, specific referent, and its positive/negative character. In addition the skill being taught and whether the students were practicing, competing, or doing both is recorded. A typical unit of feedback that might occur during a volleyball drill is: "No, bend your knees more!" This unit would be recorded as follows:

	Form						Direction			Time			Intent					Gen. Ref.			Spec. Ref.			Character		
Subject matter	P	C	P/C	A	AV	AT	1	2	3	CON	TER	DEL	E	P	C	D	A	WM	PM	OM	F	S	R	P	N	NEU
Volleyball	*			*			*				*			*					*			*			*	

Application of the System:
Augmented Feedback by Teachers

The revised system was used to code 81 of the classes in the Data Bank sample. The coding procedures consisted of recording every occurrence of augmented feedback on each one of the tapes. The tape was viewed from the time the class was scheduled to start until the time the class was scheduled to end. The results are presented in three main sections: occurrences of feedback, relationship of biographical and environmental data to feedback, and relationship among feedback types.

Occurrences of Feedback

A total of 4392 occurrences of feedback were distributed over 81 physical education classes. The mean number of occurrences was 54 instances of augmented feedback per class. Assuming an average of approximately 35 minutes per class, feedback was given on the average of more than once a minute. The range of occurrences was from 1 to 297. The median number of occurrences was 47. The distribution of instances of feedback per class is presented in Table 5.2.

The importance of feedback for the learning of motor skills is well established in the literature. It appears that in the sample of physical education classes used in this study, augmented feedback represented a sizable portion of the overall teaching task. Many teachers were observed giving augmented feedback regularly throughout the entire class period.

It appeared that augmented feedback was an integral part of the process of verbalization when teaching physical education skills. Those teachers who gave very few instances of augmented feedback also verbalized very little, while instructors who engaged in a considerable amount of verbalizations throughout their classes administered substantial amounts of feedback.

Table 5.2
Rank Order of Total Occurrences of Augmented Feedback by Class and Percentile Equivalents

(N = 81 Physical Education Classes)

Feedback[a]	Percentile	Feedback	Percentile	Feedback	Percentile	Feedback	Percentile
297	100th	75	75th	47	50th	26	25th
146		72		46		25	
128		71		44		22	
125		70		43		22	
120	95th	69	70th	43	45th	21	20th
117		66		41		20	
115		63		41		20	
110		63		39		19	
101	90th	62	65th	38	40th	19	15th
91		59		38		17	
91		58		37		15	
86		56		34		14	
83	85th	56	60th	32	35th	12	10th
82		56		32		8	
81		54		32		6	
80		52		31		5	
80	80th	50	55th	30	30th	5	5th
79		50		30		4	
78		50		29		3	
77		49		27		2	
						1	0

[a]Indicates the total occurrences of feedback for each one of the 81 classes.

The types of feedback as distributed over the 81 physical education classes are summarized in Table 5.3.

The *form* of augmented feedback for 81 physical education classes was predominantly auditory, with infrequent and scattered occurrences of auditory-visual and auditory-tactile feedback. Instructors, for the most part, merely verbalized corrections of performance without demonstrating or using tactile feedback to show students what to do. In view of the visible nature of gross movement skills, it would seem physical education would offer a unique opportunity to administer auditory-visual and auditory-tactile feedback.

Practical limitations probably accounted for the virtually exclusive reliance on auditory feedback. It is easier to administer auditory feedback, because auditory-visual and auditory-tactile feedback require multiple communication modes, while auditory feedback requires only one mode. In addition, auditory-visual feedback requires the visual attention of the student, and auditory-tactile feedback requires that the teacher be standing right next to the student, while auditory feedback requires neither. Also, auditory-tactile and auditory-visual feedback require a level of specificity that an instructor might not be desirous or

Table 5.3
Distribution of Occurrences of Types of Augmented Feedback for all 81 Classes

Category	Sub-Category	Frequency	Percent
Form	Auditory	4182	95.2
	Auditory-Visual	156	3.6
	Auditory-Tactile	54	1.2
Direction	1 student	3394	77.3
	2 or more students	758	17.3
	Whole class	240	5.5
Time	Concurrent	2142	48.8
	Terminal	2140	48.7
	Delayed	110	2.6
Intent	Evaluative	2327	53.0
	Prescriptive	1791	40.8
	Comparative	33	0.8
	Descriptive	43	1.0
	Affective	198	4.5
General Referent	Whole Movement	2622	59.8
	Part of Movement	1522	34.7
	Outcome of Movement	248	5.7
Specific Referent[a]	Force	180	7.4
	Space	2076	85.1
	Rate	185	7.6
Positive/Negative Character	Positive	1848	42.1
	Negative	2465	56.1
	Neutral	78	1.8

[a]1953 occurrences of augmented feedback with no specific referent.

capable of giving. In volleyball, for example, where many teachers felt comfortable performing, there seemed to be more instances of auditory-visual feedback than in gymnastics, where the skill and dexterity required by the activity make many more demands upon the physical abilities of the teacher.

The direction of the feedback was most frequently toward one student (77.4%), less frequently toward two or more students (17.3%) and relatively infrequently toward the whole class (5.5%). The reason for more individualized feedback may be related to the lack of similarity of student performances, and the consequent inadvisability of the teacher's categorizing large groups of student errors.

It should be pointed out that nearly all the feedback in the 81 physical education classes was either concurrent or terminal, with very few instances of delayed feedback. Nearly all terminal feedback occurred immediately after the completion of a task, seemingly before patterns of concentration and behavior could be interrupted by other behavioral activities. The few instances of delayed feedback usually occurred at

the end of the class with the teacher summarizing errors or correct patterns of movement, with an emphasis on what would have to be worked on for the next time.

Evaluative feedback (53.0%) occurred more than prescriptive feedback (40.8%), while both occurred considerably more than comparative (0.8%), descriptive (1.0%) or affective feedback (4.5%). Evaluative feedback is perhaps somewhat easier to administer than prescriptive feedback, and a substantial amount of evaluative feedback is non-specific. Whereas evaluative feedback often indicates what a student is doing correctly or incorrectly, prescriptive feedback necessitates going one step further and indicating to the student what he must do to correct performance. A teacher who gave a substantial amount of prescriptive feedback would probably not be overly concerned with student self-analysis of movements or teaching students to learn how to learn. He would possibly be more concerned with the correct performance of movements in the quickest possible way.

A teacher who gave evaluative feedback, on the other hand, though pointing out what was correct or incorrect, would do so often in a non-specific way, and would not tell the student what to do to correct performance. Teachers giving evaluative feedback may believe that students should analyze their errors and figure out ways to improve performance on their own. Teachers administering descriptive feedback, though few in number, may also perceive their roles as merely assisting students in solving their own movement problems. They may see their goal as enabling students to correct movement errors in the future when no teacher would be present, and are possibly more concerned with teaching students how to learn through self-correction.

The general referent of feedback was mainly directed toward the whole movement, with a significant amount toward part of the movement and limited feedback toward the outcome of the movement. Feedback toward part of the movement is obviously more difficult to administer than feedback toward the whole movement, since it requires more skill to be able to pick out specific errors in fractionalized segments of a given movement than to comment on the whole performance, usually in a generalized way. The relatively infrequent occurrences of feedback directed toward the outcome of the movement may have been due in part to visual intrinsic feedback about the outcome of the movement available to the student for most movement skills.

A large number of occurrences of feedback had no specific referent. Once again, perhaps the reason was that it requires more effort and ability on the part of the teacher to be specific and precise with augmented feedback. It should be noted, however, that there was a large number of occurrences of feedback with no specific referent that were positive and contained such messages as "Atta' boy," or "Way to go." There are several functions of feedback: motivation is one of them. One of the principles of learning theory is that for some learners, this kind of motivational feedback is an important factor in facilitating

the acquisition of skill. The teachers may have intended this feedback to serve as just this sort of motivational device, and in so doing may have been willing to sacrifice instructional specificity.

In most cases where a specific referent was given, the referent was toward the spatial characteristics of the movement rather than the force or rate of the movement. The reason for this may be that spatial characteristics are more visible than force or rate characteristics and therefore easier to analyze and correct.

Negative feedback occurred with more frequency than positive feedback. The large proportion of negative feedback may be due to the teachers' belief that corrections of performance were more necessary than reinforcing correct movements. Teachers may have believed that intrinsic feedback, such as view of the flight of the ball, would serve as positive feedback when the movement was correct; but intrinsic feedback alone would not necessarily help the student improve his/her movement pattern when it was incorrect. The mean, standard deviation, and range of types of feedback are summarized in Table 5.4.

Relationship of Biographical and Environmental Data to Feedback

A summary of the relationship of biographical and environmental mental data to total occurrences of feedback appears in Table 5.5.

It was of interest to note that feedback was given more readily at the elementary school level (68.9 occurrences per class) than at the secondary school level (41.9 occurrences per class). Elementary school students probably need more augmented feedback, being less experienced, less skilled and less able to correct themselves and make beneficial use of intrinsic feedback. This need, perhaps, was transmitted to teachers who consequently corrected and reinforced them more frequently. Secondary school teachers might have assumed that their students had achieved higher skill levels, and thus spent less time providing feedback.

Large classes (more than 40 students) received less augmented feedback, as compared with small- and medium-sized classes. Practical reasons were probably responsible. Classes with more than 40 students required a considerable amount of organizational and administrative skill, and class control was often an important factor. In large classes, a teacher had to spend a great deal of his or her effort and time just making sure that skills were demonstrated and explained, and that everyone had a chance to participate.

More experienced teachers gave more frequent feedback. Perhaps the experienced teachers were more practiced, more comfortable and possibly more skillful in administering augmented feedback. In addition, more experienced teachers may have been less self-conscious about their performance as teachers, and therefore, could give more attention to student performances.

More feedback occurred per class when dual sports were being taught than when team sports or games were being taught. The nature

Table 5.4
Mean, Standard Deviation and Range of Types of Occurrences of Augmented Feedback for all 81 Classes (Total Frequency 4,392)

Legend of Codes Used Above Columns:

Form
A = Auditory
AV = Auditory Visual
AT = Auditory Tactile

Direction
1 = One Student
2 = Two or More
3 = Whole Class

Time
Con = Concurrent
T = Terminal
Del = Delayed

Intent
E = Evaluative
P = Prescriptive
C = Comparative
D = Descriptive
A = Affective

Gen. Ref. = *General Referent*
WM = Whole Movement
PM = Part of Movement
OM = Outcome of Movement

Spec. Ref. = *Specific Referent*
O = No Specific Referent
F = Force
S = Space
R = Rate

Pos/Neg Char = *Positive/Negative Character*
P = Positive
N = Negative
Neu = Neutral

		Form			*Direction*			*Time*			*Intent*				
Statistic	*Total*	*A*	*AV*	*AT*	*1*	*2*	*3*	*Con*	*T*	*Del*	*E*	*P*	*C*	*D*	*A*
Mean	54.17	51.58	1.93	0.67	41.86	9.35	2.96	26.42	26.41	1.36	28.70	22.11	0.41	0.53	2.42
S.D.	43.15	42.04	2.99	1.94	42.79	8.53	5.01	24.00	31.04	2.33	30.73	15.79	0.93	1.29	4.81
Range	1-297	1-290	0-20	0-13	1-296	0-31	0-31	0-99	0-198	0-10	0-227	0-63	0-5	0-10	0-35

	Gen. Ref.			*Spec. Ref.*				*Pos/Neg Char*		
Statistic	*WM*	*PM*	*OM*	*O*	*F*	*S*	*R*	*P*	*N*	*Neu*
Mean	32.52	18.79	3.06	24.07	2.22	25.60	2.25	22.79	30.38	1.00
S.D.	28.99	19.69	5.34	25.94	3.77	19.40	2.96	26.14	22.16	3.09
Range	1-198	0-98	0-34	1-194	0-17	0-92	0-15	0-192	0-101	0-26

Table 5.5
Relationship of Biographical and Environmental Data of Total Occurrences of Feedback

Type of Data	Total of classes	Percent of classes	Total occurrences of feedback	Percent of occurrences	Occurrences per class
Elementary	40	49.4	2754	62.7	68.9
Secondary	41	51.6	1638	37.3	41.9
Number of students					
0-20	20	24.7	1078	24.5	53.9
21-40	51	63.0	2850	64.9	56.0
41 and over	10	12.3	464	10.6	46.4
Male	28	34.6	1569	35.7	56.0
Female	28	34.6	1543	35.1	55.1
Coeducational	25	30.8	1280	29.1	51.2
Years of Teacher Experience					
0- 5	39	48.1	1760	40.1	45.1
6-10	15	18.5	912	20.8	60.8
11 and over	27	33.4	1720	39.2	63.7
Dual sports	25[a]	19.6	1532	34.9	61.3
Team sports	34[a]	26.2	1553	35.4	45.7
Games	14[a]	10.8	426	9.7	30.4
"Other activities"	57[a]	43.4	881	20.1	15.5

[a]Indicates number of classes in which skill was observed.

of the activity of dual sports lent itself more to the administration of augmented feedback, because each performance stood out individually and was easier to see and therefore correct. In addition, most dual sports in the sample involved gymnastics and tumbling in a noncompetitive situation. It was much easier to stop the flow of activity in dual sports than in team sports and games, which were often contests between teams.

Relationship Among Feedback Types

In order to assess relationships in the ways that feedback was given across categories, a cross-tabulation was made between each of the seven major categories. A chi square was used to determine statistical significance, and a .001 level of confidence was adopted. Twenty-one tables indicating the relationship of feedback types with each other appeared in the original research report (Tobey, 1974).

When summarizing the proportional differences (relative to total occurrences) of feedback types to each other, certain combinations appeared together over and over again. For example, whenever the subcategory, prescriptive feedback, occurred, concurrent feedback usually occurred along with it; and feedback directed toward the whole movement occurred in greater proportions with feedback with no specific referent. In effect, by analyzing these combinations, a summary of significant relationships can be made for purposes of discussion.

Relative to total occurrences, the following sub-categories seemed to appear in combination with each other more often than with other sub-categories.

Group 1

Feedback directed toward the whole class
Feedback directed toward the whole movement
Feedback with no specific referent
Delayed feedback
Positive feedback

Group 2

Feedback with a specific referent toward space
Concurrent feedback
Prescriptive feedback
Negative feedback
Auditory-tactile and Auditory-visual feedback

Although not necessarily indicative of absolute frequencies, the proportional differences did begin to paint a picture of typical kinds of feedback that were given. If one concentrated on high frequency sub-categories, one could see a typical feedback occurrence as being directed to the whole movement, with no specific referent and probably positive in nature. Another typical occurrence would be concurrent, prescriptive feedback about the space of the movement that was negative in character. A typical example of the first kind would be, "Good girl," just after the student had done something well. A typical example of the second kind would be, "No, point your toes more," as the student was performing a gymnastic stunt.

The fact that significant relationships did not occur between certain groups was worth noting. Positive feedback was almost never specific. General feedback was rarely negative. Feedback with no specific referent was rarely concurrent feedback, and feedback directed toward the whole movement was almost never negative. It appears that when talking about general levels of skill, teachers were less inclined to be negative or prescriptive, but would not hesitate to do so when being more specific. Although research indicates that positive feedback is beneficial in order to reinforce correct movements, specific feedback was nearly never positive. Perhaps the potential for specific positive feedback has yet to be developed.

Conclusion

As this study progressed, it became evident that many of the differences in ways that feedback was administered were due to practical limitations and to what seemed to be a less difficult approach for the teacher. There was very little theoretical basis for variations in approach. In fact, individual teachers varied their approach very little. For a given teacher, the feedback tended to be stereotyped and habitual. It should be noted that even with apparently no conscious effort to vary

feedback, the teachers in the sample did administer a large amount of feedback that had visible effects upon their students' movement patterns. Augmented feedback is apparently both a frequently used and influential variable in the teaching of movement skills.

It would seem that for so crucial a teaching variable as augmented feedback, however, a conscious effort could be made by teachers to give the most efficient kind of feedback for a particular class, situation, and skill. It would appear to be possible to use a theoretical framework, such as the research on feedback in the present study, to illustrate different ways to give augmented feedback for different situations. Fishman's instrument (perhaps as modified by Tobey) could then be used to analyze teachers and make them more cognizant of what they were doing in terms of the theoretical framework. Teachers trained in such a manner might then be aware of various ways to administer augmented feedback, and conscious of what and why they were using the type of feedback they employ.

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Chapter Six

Pedagogical Moves

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Pedagogical moves, a term coined by Arno A. Bellack in his book *Language of the Classroom* (1966), describes the communication maneuvers of teachers and pupils. These maneuvers or moves include: *structuring*, *soliciting*, *responding*, and *reacting*. They form the core of an elaborate system of analysis which Bellack used to examine the function, content, and sequence of both teacher and pupil communication.

The Descriptive System

For this project, an adaptation of the Bellack system was used (Morgenegg 1978). Categories which were not descriptive of physical education were deleted, while others were added to account for some of the unique features of this subject. The system was composed of seven dimensions, each of which was divided into categories. System dimensions and categories are presented in Table 6.1.

The unit of analysis for this instrument was the pedagogical move. Changes in the function of the move signaled the beginning of a new move; a change in the source of the move, from teacher to pupil or vice versa, was also considered a change in function.

Teacher moves were coded by one category for each of the dimensions described above. Pupil moves, on the other hand, were coded only by function (structuring, direct and indirect soliciting, responding; neutral, positive and negative reacting), interaction unit and cycle. The duration of each move was also recorded but only for teachers. It was impractical to record duration for pupil behavior because it was largely non-verbal and mostly in remote areas of the gym, out of camera range. Duration was measured in elapsed seconds.

Teacher soliciting moves were coded by the verbal or non-verbal nature of the expected response. If a teacher solicited a front roll, note was made in a post script column on the coding sheet indicating the solicitation had as an expected response a non-verbal move (the forward roll).

Teacher reacting moves were coded according to the verbal or non-verbal move which occasioned the reaction. If a teacher complimented

a free throw shot, a note was made in the post script column on the coding sheet that the positive reaction was occasioned by a non-verbal move.

Table 6.1
System Dimensions and Categories

Dimension	*Categories*
Source:	teacher, pupil
Function:	structuring, soliciting, responding, reacting
Meaning:	substantive, non-substantive, substantive/non-substantive
Mode:	verbal, non-verbal, verbal/non-verbal
Direction:	individual, group, class
Cycle:	combinations 1-21
Interaction Unit:	short (1-8 moves), extended (9 moves or more).

Source Dimension

Source refers to the person responsible for a particular verbal or non-verbal communication. Teacher and pupil represent the source categories.

Function Dimension

Categories of the function dimension identify the various ways the teacher and pupil use verbal and non-verbal communications.

(1) *Structuring* moves set the context for subsequent behaviors or events i.e., they serve to identify the future activities of teachers and pupils. In structuring moves, the speaker, usually the teacher, gives direction to the forthcoming activity by identifying such elements as the performing agent, which tasks are to be performed, and when and where they are to be executed (Bellack, 1966).

Example: Teacher — "All right, on the balance beam as on any piece of equipment, you need a spotter; and it's the spotter's responsibility to know what the person is going to do and when he is going to do it."

(2) *Soliciting* moves, like structuring moves, are directive in nature, i.e. they indicate what is to occupy the respondent's efforts. Unlike the structuring move, however, the solicitation carries the expectation of a response. Solicitations take all grammatical forms — declarations, imperatives, interrogatives, etc. This sytem accounts for these various grammatical forms with the categories of direct solicitation for commands, and indirect solicitation for questions (Bellack, 1966).

Examples: Teacher — "Come over here and sit down." (direct solicitation).
Teacher — "Dan, do you know how to play team handball?" (indirect solicitation).

(3) *Responding* moves fulfill the expectation of the solicitation. Responding, in other words, bears a reciprocal relationship to soliciting and only occurs in relation to it (Bellack, 1966, p. 18). In the classroom, speech is the most common response form while in physical education, movement is more common.

Examples: Teacher — "Everyone get a ball." (solicitation).
Pupils — (For the response, they get balls as solicited.)

(4) *Reacting* moves differ from responding; while a response is directly elicited by a solicitation, reacting is only occasioned by preceding moves. In other words, a preceding structuring, soliciting or responding move provides the opportunity for a reaction but does not necessarily elicit one (Bellack, 1966). For example, a teacher watches a solicited response — an outstanding headstand perhaps. The teacher has an opportunity to react

by saying, "That's good," or something similar. However, the teacher, according to his or her choice, may or may not react. Thus the headstand provided the opportunity for a reaction and was, therefore, the occasioning move.

Meaning Dimension

The meaning dimension describes the content of the pedagogical move.

(1) *Substantive* communications are those which directly relate to, or call for a demonstration of one's knowledge of the subject matter.

Example: Teacher — "Before you shoot, think about hitting within the red square on the backboard."

(2) *Non-substantive* communications carry information about social, managerial or procedural tasks. Such communications may support the subject matter or contribute to its orderly conduct, but they do not directly contribute to one's knowledge of it.

Examples: Teacher — "All right, get your shoes on and line up at the door."
Teacher — "That's my grade book, and you don't belong in there."

(3) The *substantive/non-substantive category* is designed to accommodate cases in which both substantive and non-substantive information is communicated in the same utterance.

Example: Teacher — "Today we are going to play Steal the Bacon, but first I need to call roll."

Mode Dimension

(1) *Verbal* behavior involves the use of language to execute a pedagogical move.

(2) *Non-verbal* behavior is characterized by the use of physical or bodily motions. Of particular concern are those non-verbal motions which facilitate the teaching or learning process such as spotting, demonstrating, gesturing in a pedagogically relevant way (signalling to stop by using a hand clap), etc.

(3) *Verbal and non-verbal modes* may be combined in some instances. For example, a teacher may simultaneously explain and demonstrate a volleyball serve.

Direction Dimension

The direction dimension identifies the size of the pupil group addressed during a pedagogical move. (1) the *individual* category refers to a communication to one pupil; (2) the *group* category identifies a cluster of more than one pupil but not the whole class; (3) the *class* category identifies the whole class as recipient of communications (Fishman, 1974).

Cycles

Cycles are pre-determined patterns of pedagogical moves. A cycle begins with an initiatory move (structuring or soliciting) and continues until the next structuring move or unstructured solicitation. There are twenty-one different cycles of pedagogical moves; some examples of cycles are:

1. Structure-solicit-respond
2. Structure-solicit-respond-react
3. Solicit-respond
4. Solicit-respond-react

The cycle yields information about the sequential nature of teaching because it focuses on the various ways pedagogical moves or discrete events are chained together into larger patterns of behavior.

Interaction Units

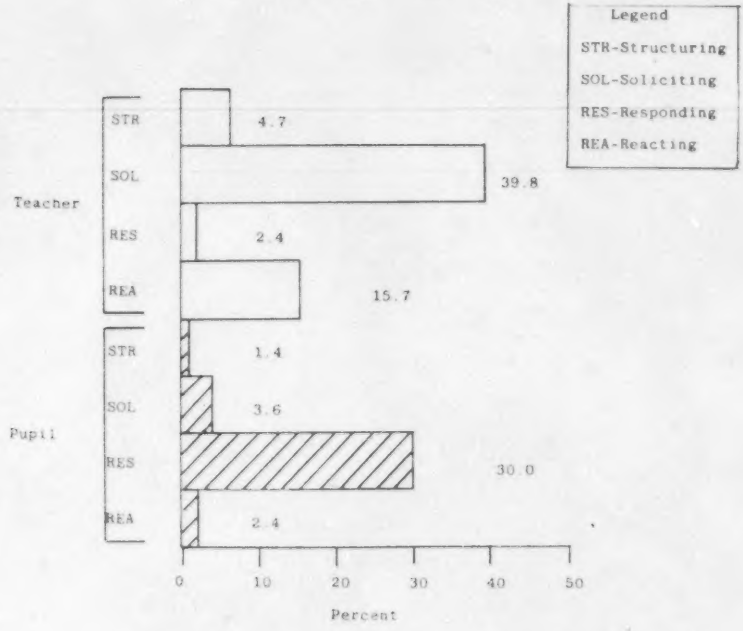
An interaction unit is a measure of the number of moves, regardless of pedagogical function, exchanged between the teacher and a particular individual or group. Every time the direction of an interaction changes, a new interaction unit begins. Units consisting of one to eight moves are classified as *short* while units of nine or more moves are classified as *extended*.

Application of the System:
Pedagogical Moves of Teachers and Students

The system was used to code 40 physical education classes from the Data Bank tapes. Of this number, 20 were from the elementary grades and 20 from the high school grades. Ten of the 20 elementary classes were coeducational; of the remaining classes, 7 were boys' classes and 3 were girls' classes. The high school classes were divided equally: 10 boys' and 10 girls' classes. Several activities were represented in the sample. There were 11 basketball classes, 6 gymnastics, 4 games, 3 each of multiple activities, volleyball, and field hockey, 2 each of relay races, movement education and parachute activities, and 1 each of skills testing, wrestling, soccer, and dance.

In Figure 6.1 one may see how, in the broadest sense, the structuring soliciting, responding, and reacting moves are distributed for teachers and pupils combined. Of the 17,000 moves for teachers and pupils, the teacher dominates with 39.8% soliciting, followed by pupil responding (30.0%). Teacher use of reacting is the next most frequent move (15.7%). It seems clear that, on the average, the teacher's role is

Figure 6.1
Percent Distribution of Pedagogical Moves
for All Teachers and Pupils



primarily that of a solicitor and reactor while the pupils' role is that of responder. There is, however, considerable variability in how these roles are exercised from class to class. This variability is shown in Table 6.2. The range of percentages for each move is quite wide suggesting that some teachers solicit or react more than others. There are a number of factors that might account for this variability, including the class activity, teacher personality, class size, etc.

Table 6.2
Pedagogical Moves for Teachers and Pupils Combined

Variable Name	Freq	Percent Range	Percent Mean	Percent Stand. Devia.	Percent Median
Teacher					
Structuring	745	1.3-13.6	4.7	2.4	4.0
Soliciting	6698	30.1-49.7	39.8	4.3	38.8
Responding	405	0.0- 7.6	2.4	1.8	1.9
Reacting	2733	6.9-34.1	15.7	5.7	14.1
Teacher Total	10581				
Pupil					
Structuring	240	0.0- 4.0	1.4	1.1	1.2
Soliciting	641	0.1-11.3	3.6	2.7	1.2
Responding	5139	12.9-38.5	30.0	5.4	30.5
Reacting	399	0.0- 9.2	2.4	2.0	1.7
Pupil Total	6419				
Teacher-Pupil Total	17000				

A closer examination of data gathered on individual moves suggest interesting patterns. Of particular interest are the soliciting and reacting moves, since they are used so frequently. The soliciting moves can take several grammatical forms — declaration, imperative, or interrogative. Therefore soliciting moves were coded by their form as either direct or indirect. Direct solicitations are declarations or imperatives,

Table 6.3
Distribution of Direct and Indirect Solicitations

Variable Name	Freq./%	Percent Range	Mean	Percent Stand. Devia.	Median
Teacher					
Direct Solicitation	5627/76.6	21.9-94.6	76.6	13.7	78.8
Indirect Solicitation	1071/15.0	1.8-69.3	15.1	11.4	12.1
Pupil					
Direct Solicitation	40/ 0.6	0.0- 3.6	0.6	0.8	0.0
Indirect Solicitation	601/ 7.7	0.7-23.5	7.7	5.7	6.5
TOTAL SOLICITATIONS	7339/100				

while indirect solicitations are questions. Although the data for the direct and indirect solicitations are summarized in Table 6.3 several items bear emphasizing. The ratio of direct to indirect solicitation is 5:1 for teachers and 1:15 for pupils.

Thus, pupils approach teachers with solicitations which are almost exclusively questions, while the teacher uses principally direct solicitations. This observation, however, must be tempered with the observed variability in direct/indirect solicitations that occurred from class to class.

Every reacting move for teacher and pupil was coded according to its neutral, positive, or negative tone or intent. For example, if a teacher said, "That was a good shot," a positive reaction was recorded. The distribution of the neutral, positive, and negative reacting moves is presented in Table 6.4.

Table 6.4
Distribution of Neutral, Positive, and Negative Reacting

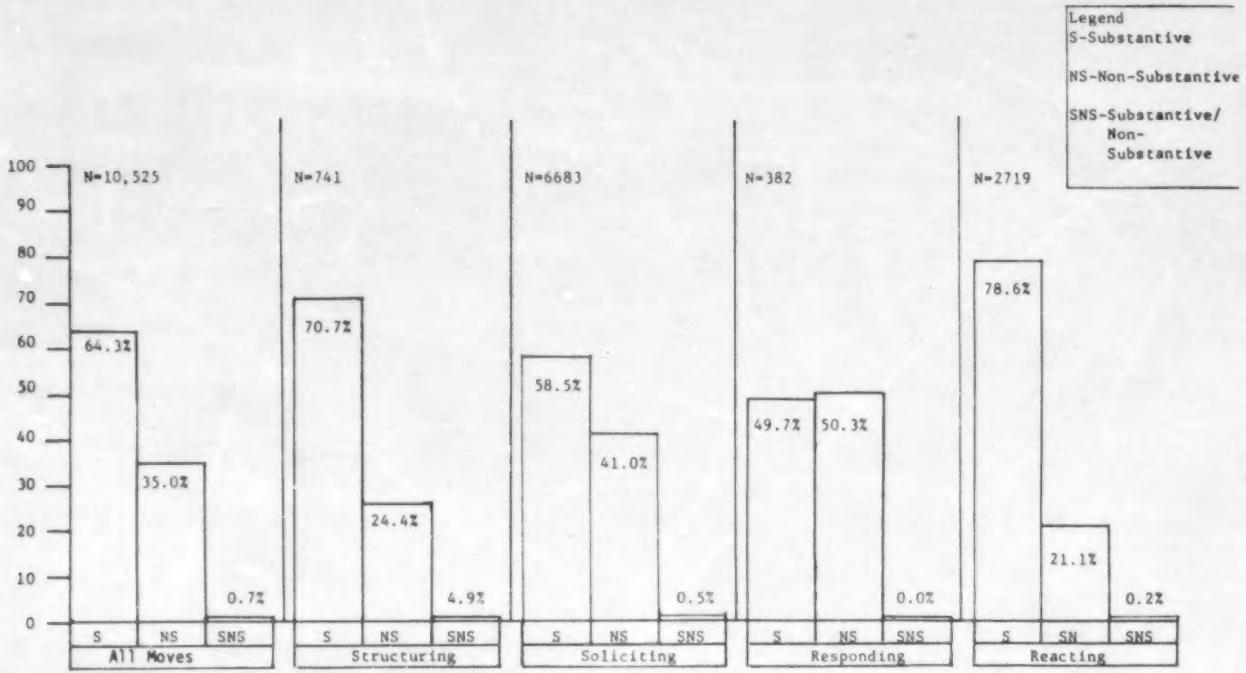
Variable Name	Freq./%	Percent Range	Percent Mean	Percent Stand. Devia.	Percent Median
Teacher					
Neutral Reacting	882/29.4	5.3-68.8	29.4	17.7	25.0
Positive Reacting	1252/38.0	1.5-82.5	38.0	19.6	35.3
Negative Reacting	599/19.4	5.0-39.8	19.4	9.6	17.9
Pupil					
Neutral Reacting	330/11.1	0.0-38.6	11.1	9.4	7.9
Positive Reacting	11/ 1.8	0.0- 4.7	0.4	0.9	0.0
Negative Reacting	58/ 0.4	0.0- 1.9	1.8	3.4	0.1
TOTAL REACTING	3132/100				

While the teacher was earlier identified as the principal reactor, it is now clear that he/she uses the positive form a substantial part of the time — at least twice as often as negative reacting. The pupil, on the other hand, uses neutral reacting more than the other forms. (Examples of pupil neutral reacting include restating the rules of a game in words other than those the teacher used, or simply saying "Oh," when the teacher tells a student why he should not chew gum in class, etc.)

The duration of each teacher pedagogical move was measured. This was done with the digital clock which was imprinted on each tape. Of particular interest is the structuring move. Although teachers do not structure as frequently as they solicit or react, the average length for structuring moves is at least four times that of other moves. The average duration for each move was found to be: structuring, 12 seconds; soliciting, 3 seconds; responding, 2 seconds; reacting, 3 seconds.

The distribution for the meaning categories is found in Figure 6.2. Of the 10,525[1] teacher moves, over half were substantive in nature. This dominance of the substantive category persists as each move is examined by its meaning. The only exception is the responding move, where

Figure 6.2
Percent Distribution of Meaning for Each Pedagogical Move for All Teachers



the percent of non-substantive communications slightly exceeds that of substantive communications. In general, the content of contiguous moves was the same. For example, if a soliciting move is substantive in content, the response which follows is also substantive. The non-substantive dominance of teacher responses suggests that a large portion of pupil solicitations are also non-substantive.

Each teacher pedagogical move was coded by the verbal or non-verbal mode of communication. Speech was the dominant mode used with every move. Only in structuring does any appreciable use of the non-verbal appear, and at that it is in combination with speech. Of course it is in structuring that the teacher demonstrates, and thus makes greater use of non-verbal communications. It was somewhat surprising to learn that teachers did not demonstrate more. For physical education, where modeling of movement is a commonly recommended teaching technique, there was, as evidenced by the infrequent use of the non-verbal mode, little demonstrating.

Each teacher move was coded also by the number of pupils toward whom the move was directed. Generally, the individual, rather than the class, receives the higher percentage of all moves; the exception is

Table 6.5
Rank Order of Teacher and Pupil Initiated Teaching Cycles

Rank Order of Cycle	Cycle Number and Description	Frequency	Percent of All Teacher Cycles
	TEACHER INITIATED CYCLES		
1	14-SOL, RES	3566	51.1
2	13-SOL	1341	19.2
3	18-SOL, RES, REA	1084	15.5
4	1-STR	335	4.8
5	5-STR, SOL, RES	258	3.7
6	16-SOL, REA	91	1.3
7	19-SOL, RES, REA, REA ...	73	1.0
8	9-STR, SOL, RES, REA	59	.9
9	17-SOL, REA, REA ...	52	.7
10	3-STR, REA	42	.6
11	2-STR, SOL	27	.4
12	4-STR, REA, REA ...	21	.3
13	21-SOL, RES, REA, RES .... REA...	7	.1
13	10-STR, SOL, RES, REA, REA ...	6	.1
15	20-SOL, RES, REA, RES ...	3	.1
15	7-STR, SOL, REA	3	.1
17	12-STR, SOL, RES, REA, RES .... REA ...	2	.1
17	15-SOL, RES, RES ...	2	.1
17	8-STR, SOL, REA, REA ...	2	.1
20	6-STR, SOL, RES, RES ...	0	0.0
20	11-STR, SOL, RES, REA, RES ...	0	0.0
	Total	6974	

(Table 6.5 (continued)

	PUPIL INITIATED CYCLES		
1	14-SOL, RES	348	40.0
2	13-SOL	189	21.7
3	3-STR, REA	110	12.6
4	4-SOL, REA	49	5.6
5	5-STR, SOL, RES	37	4.2
6	18-SOL, RES, REA	36	4.1
7	1-STR	35	4.0
8	2-STR, SOL	23	2.6
9	9-STR, SOL, RES, REA	18	2.1
10	10-SOL, RES, REA, REA ...	7	.8
11	4-STR, REA, REA ...	6	.7
12	7-STR, SOL, REA	5	.6
12	17-SOL, REA, REA ...	5	.6
14	10-STR, SOL, RES, REA, REA ...	1	.1
14	15-SOL, RES, RES	1	.1
14	21-SOL, RES, REA, RES ...	1	.1
15	6-STR, SOL, RES, RES ...	0	.0
15	8-STR, SOL, REA, REA ...	0	.0
15	11-STR, SOL, RES, REA, RES	0	.0
15	12-STR, SOL, RES, REA, RES ... REA ...	0	.0
15	20-SOL, RES, REA, RES ...	0	.0
	Total	871	

CODE
STR — Structuring
SOL — Soliciting
RES — Responding
REA — Reacting
...— One or more moves of the kind; e.g. "REA ..." means one or more than one additional reacting move.

structuring. In structuring, the class dominates the teacher's attention. This seems reasonable, however, because it is during structuring that the class is usually gathered together to receive instructions for the day or the next activity.

Patterns and Sequences of Teacher Discourse

One strategy for examining patterns and sequences of moves was with the teaching cycles. The reader will recall that teaching cycles are pre-determined combinations of pedagogical moves. Table 6.5 shows the rank order of teacher initiated and pupil initiated cycles, as they occurred in the coded classes.

The SOL, RES (solicit, response) cycle is clearly the most frequently initiated by teachers. This cycle alone accounts for over 50% of all teacher initiated cycles. This also means that in over half of the cycles, a pupil response is not followed by a reaction (feedback) from the teacher.

Cycle #13 makes use of only a SOL (solicitation) and accounts for nearly 20% of all teacher initiated cycles. There is no pupil response

associated with this cycle. This means that teachers make 1341 solicitations for which pupil responses are not attended to by the teacher. This suggests that the teacher moves about the class giving solicitations but not staying in the vicinity to watch the pupil response.

The rank order of pupil initiated cycles differs little from that of the teachers. In fact, the rank order of cycles 13 and 14 is the same for teachers and pupils. The major difference in teacher and pupil cycles is their frequency. Teacher initiated cycles far exceed pupil initiated cycles for all twenty-one cycles.

Another way of viewing the patterning of teacher behavior is by the number of moves that are exchanged between teacher and pupil. The interaction unit closely parallels the cycle in that it too is made up of pedagogical moves. However, the distinctive feature of the interaction unit is that the number of moves exchanged between teacher and a particular pupil or group of pupils is counted and not the pattern of moves. Thus in a conversation between a teacher and pupil there could be a number of cycles which take place. Three SOL, RES cycles could take place and would be tallied as an interaction unit of six moves. It was expected that the interaction data would show longer teacher-pupil interchanges than could be accounted for by the cycles. It would have been interesting to see, for example, longer interactive units when initiated by the teacher; yet interchanges were remarkably short. Seventy-four percent of teacher initiated interaction units contained one or two moves; sixty-three percent of all pupil initiated units contained one or two moves.

The occurrence of extended interaction units (9 moves or more) was low — 3.1%. Extended units, it was observed, usually occurred at the beginning of the class when the teacher led the class in exercises for extended lengths of time. It does not take long to create an extended unit when the teacher has a class do push-ups by command: down, up, down, up, etc.

A comparison of the distribution of moves by elementary and secondary grade levels revealed appreciable differences only with structuring and reacting. Elementary pupils structure somewhat more than secondary pupils. This is not surprising when one considers the frequently observed spontaneity of elementary children. It is not unusual to see an elementary child approach the teacher and strike up a conversation about the day's activities or what the child did over the weekend. In addition, it appears that elementary teachers tend to use more positive reactions than secondary teachers. Aside from these differences, teacher and pupil behaviors at both elementary and secondary grade levels are remarkably similar in their distributions.

Summary

Bellack suggested that language, as used between teachers and pupils, serves four functions: to structure, solicit, respond, and react. Furthermore, he pointed out that teachers and pupils use language in

complementary ways while following certain implied rules that are consistent with their respective roles as players in a communications game (Bellack, 1966; Wittgenstein, 1958). This is not a game in the usual sense of the word, e.g., it is not a power struggle or one in which there are secret strategies designed by the players (teacher and pupil) to take advantage of one another's weaknesses in order to emerge victorious from an encounter. The game is a cooperative one; not a contentious venture with the ostensible win being pupil learning. This is a game only in the sense that there are agreed upon rules for the participants (even though they are implied) and there is a fairly mutual adherence to the rules.

The findings for this study are summarized in two lists of statements: one pertaining to the teacher, the other to pupils.

Pertaining to the teacher:

1. The most active player in the gymnasium is the teacher. The teacher executes almost 2/3 of all combined moves for teachers and pupils. The dominant moves used by the teacher are soliciting (39.8%) and reacting (15.7%).
2. All teacher moves are short (2-3 seconds) except structuring which averages 12 seconds.
3. Teachers use direct soliciting five times more frequently than indirect soliciting.
4. Teachers use positive reacting on a 2:1 ratio to negative reacting.
5. Eighty-nine percent of all cycles are initiated by teachers.
6. Interchanges of pedagogical moves between teacher and pupils is generally very short, i.e. one or two moves.
7. Substantive meaning dominates the teacher moves.
8. Verbal mode is used principally for communicating the pedagogical moves.
9. In general, structuring moves are directed to the class, while soliciting moves are directed to individuals.

Pertaining to pupils:

1. The pupils' dominant role is responding to the teacher's solicitations.
2. Pupils' responses are, for the most part, non-verbal.
3. Pupils use indirect solicitations on a 15:1 ratio to direct solicitations.
4. Pupils initiate 11% of all cycles.
5. Over half of all pupil initiated interaction units are only 2 moves in length.
6. When pupils react, it is in a neutral form, rather than a positive or negative form.

Teacher-pupil interchanges are remarkably similar across grade levels, for both teachers and pupils. The few exceptions are these:

1. Elementary pupils structure slightly more than secondary pupils.
2. Elementary teachers react positively almost twice as frequently as secondary teachers.

Although these statements paint a certain descriptive picture of life in the gymnasium, they do not deny that each class and teacher is different in the way the communication game is played; indeed, there is

great diversity in the distribution of each pedagogical move, in its content, direction, etc. However, if these results are at all indicative of the population as a whole, then there seem to be certain rules that govern the ebb and flow of communications, and thus define the respective roles of teacher and pupil — at least in a descriptive sense.

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[1] This total is fifty-six short of the total number of moves reported earlier. These fifty-six moves were not coded by any of the categories of the meaning dimension because utterances were either inaudible, or too short to be intelligible. Totals may vary on other dimensions and categories for the same reason.

Chapter Seven

Review

RICHARD HURWITZ

In the preceding chapters you have encountered a wealth of information which may have interested and informed you, but which also may have astounded or overwhelmed you. If the latter is the case, you are not alone. To be astounded by the amount of data made available by descriptive analytic studies of the behaviors of teachers and students in physical education classes, and to be overwhelmed by the complexity and diversity of those behaviors is understandable.

However, after a careful analysis of the information and with some extended reflection on the findings and implications suggested by the authors, three major themes emerge. The first deals with the *pace* at which things happen in the gymnasium, the second with a *general model of teaching* prevalent among the teachers on the Data Bank videotapes, and the third with the *patterns of variability* of the behaviors of both teachers and students.

As each of these themes is discussed below, one should keep in mind that the generalizations drawn are limited by at least two factors:

1. Physical education as depicted in the Data Bank sample is only a limited representation of physical education as it occurs in general, and the systems together study only a portion of what occurs in physical education classes.
2. Not all of the five studies reviewed in this monograph focused on the same teachers or students in the Data Bank sample.

The Pace

It should be quite clear from the data presented and the conclusions drawn in most of the preceding chapters that events occurred in the sample of physical education classes at a remarkably rapid pace. The specific cause of this pace is unclear. Perhaps it was due to the inherent nature of an environment whose single most salient feature is movement — the movement of people, equipment and activity situations. Perhaps it was caused by efforts of students to keep pace with a changing variety of stimuli, or to the efforts of teachers to keep up with the needs of students and the demands of the learning environment. Perhaps the cause was a combination of all of these factors, or was something else altogether.

Whatever the case, on the average, students made nearly three shifts in function every minute, while teachers made twice as many or about

six shifts per minute. This means that in a 30 minute class of 25 students, there would be over 2,400 shifts of function by the teacher and students, with each teacher function lasting an average of about 10 seconds, and each student function lasting an average of about 20 seconds. Remarkable!

A look at the average duration of specific categories of teacher and student behavior may make the picture of rapid shift even clearer. While most of us are accustomed to planning and thinking of what happens in the gymnasium in terms of minutes, Morgenegg found that over 90% of the teachers' pedagogical moves lasted an average of 3 seconds or less; only structuring moves lasted longer, for an average of 12 seconds. And Barrette's study revealed that only the teacher functions of administering and leading exercises had average durations of over 15 seconds, while close to 60% of the occurrences of teacher functions averaged less than 10 seconds apiece.

On the students' side of the coin, the only function which seemed to last for any substantial length of time was game playing; that was for only 40.4 seconds, and it even included two interruptions to receive information! Students' movement functions averaged 15.4 seconds apiece, while their non-movement functions lasted a bit longer, for an average of 25.5 seconds. Each occurrence of actual practice lasted for only 17.4 seconds.

The general picture, then, is one of a fast paced, constantly changing, and perhaps exciting physical education classroom. One should not go away, however, with the idea that all of this means a confusion and scattering of energies and purposes in the gymnasium. There is nothing in the data to suggest that a less molecular study of the behaviors in physical education classes would reveal that students and teachers were making steady overall progress toward the achievement of worthy educational objectives. The studies in this book merely indicate that such progress might follow a course full of zig-zagging, backtracking and side-stepping.

The General Teaching Model

The observation is made in Chapter Three that the behaviors of the teachers tended "to show a general pattern not unlike the hallmarks of what has come to be known as the traditional teaching model." This conclusion is quite well supported by the information in all of the chapters. It is indeed the second general theme that emerges from an overall review of the data.

Consider the general pattern of the pedagogical moves of teachers and students. Nearly two thirds of the 7,845 observed cycles included a teacher solicitation move followed immediately by a student response. This begins to paint a picture of a traditional, teacher centered classroom.

The picture may be further completed by a consideration of the five basic patterns of interaction presented in Chapter Four. The patterns

are characterized by a great deal of information giving and direction giving by the teacher, and by narrow responding, extended drilling, or extended game playing by the students.

The pattern of the occurrences of teacher functions over quarters of the class period also reinforces the traditional picture. This pattern is, in fact, what led to the observation quoted above. It is characterized by the following: a high frequency of organizing, administering, preparatory instructing, and leading exercise occurring during the first quarter of the class period, but decreasing thereafter; the highest level of concurrent instructing, observing and officiating occurring during the middle two quarters of the period; and the highest level of intervening instruction and other interacting occurring during the final two quarters. It seems that such a pattern of teacher behavior would occur during a class which begins with administrative activities, organization, explanation and direction giving by the teacher, continues with student practice and drill while the teacher is going around observing and giving feedback, and concludes with some game play or competition interrupted at times by teacher feedback or strategy instruction — again highly compatible with a traditional teaching model.

Consider, too, the noticeable lack of content related dialogue and questioning that is reported. This suggests an absence of the problem solving and guided discovery models of teaching and a traditional emphasis on motor as opposed to intellectual learning. There is, however, some evidence to the contrary. One characteristic of the problem solving model was noted — a surprising lack of teacher demonstration. Of course, it has not yet been determined if the lack of demonstration was intentional, accidental, or necessitated by a lack of teacher skill.

There are two more findings, however, which further support the conclusion that, in the traditional mold, most of what happened in the physical education classes revolved around the activities and the directives of the teachers.

The first finding, quite consistent with the general patterns discussed at the beginning of this section, is that teachers initiated most of the teacher-student interaction in their classes. More specifically, the teachers initiated 89% of all pedagogical cycles; and only about 4% of the students' behaviors recorded by the CAFIAS system were strictly student initiated.

The second finding is that the major teaching agency in the physical education classroom was the teacher. Teachers shared only 16.2% of the teaching functions with their students, and they delegated only 1.4% of these functions to students. In addition, they hardly ever used any written materials or teaching aids and very seldom used a student to demonstrate.

It seems rather clear, then, that the teachers in the Data Bank sample demonstrated specific behaviors and patterns of behavior which are quite characteristic of a traditional teaching model in physical education. This observation should not be considered, however, as a negative judgment of their teaching ability. It is, after all, only an observa-

tion. There are several indications among the data which lead to a corollary observation that much of what the teachers did in the traditional mold, they did quite well. For example, the general atmosphere of their classrooms was fairly positive. Most of their reactions to student behavior were positive, and they resorted to very little punishment and correction of student behavior. There are indications as well that there were very few negative reactions by students; although most of the student reactions were more neutral than positive.

The teachers in the sample also seemed concerned with individual students. About 54% of their solicitation moves, 98% of their responding moves, and 69.2% of their reaction moves were directed to individual students. They directed 77.3% of their feedback to individual pupils, and carried out between half and two thirds of their concurrent and intervening instruction with only one student. These findings may appear to conflict somewhat with the reports that, overall, only 30% of the teachers' behaviors were directed to one student, and that most of the structure in their classes included the whole class working together. The conflict, though, is easily resolved; for, again in the traditional mold, the teachers still directed 60% of their preparatory instruction and 70.1% of their structuring moves to the whole class. Further, the fact that a whole class is working together does not preclude the possibility that a teacher may still work with and offer feedback to individual pupils. This did indeed, seem to be the case.

The evidence concerning feedback includes still other indications that the teachers were fairly competent in implementing a traditional teaching model. In general, the teachers seemed to be concerned with giving feedback to their students. They gave feedback an average of once a minute, or about 54 times per class, and about 25% of their pedagogical moves were reactions to student behaviors. Further evidence concerning the amount of feedback given by the teachers can be extrapolated from the fact that about 30% of their functional behaviors were categorized as concurrent instructing, intervening instructing and other interacting related to motor activities. These three functions include, but are not limited to, the giving of feedback. The teachers also made an observable effort to give fairly immediate feedback — 97.5% of it was either concurrent or terminal; and they often used feedback that would be generally motivating and reinforcing to their students: positive feedback directed to a whole movement, with no specific referent.

A final point which supports the teachers' competence in carrying out a traditional teaching model regards their apparent concern with instruction. Over 64% of their pedagogical moves were substantive, or related to the content of physical education. And, overall, they spent about 54% of their time in actual instruction or instruction related pursuits, and a surprising 76.6% of their time preparing for, guiding, or observing the motor activities of the students.

The preceding fact leads to what might be considered another appar-

ent conflict in the data. Chapter Two reports that students spent 52.1% of their time on substantive concerns and only 36.8% of their time in actual movement. How can the teachers be spending at least 25% more time than students in dealing with motor activities?

A plausible answer to the apparent conflict derives from the particular methodologies of the descriptive systems utilized in the two studies, and from the organizational patterns implemented by the teachers in the sample. The system used in the study of student behavior focused on single students, each for three 5 minute periods per class, and on only 40% of the students in each class. The system used in the study of teacher functions focused on each teacher for the whole class. If the students were organized so that each individual spent a lot of time waiting in line or waiting for a turn and thus spent only about 50% of his or her time actually dealing with substantive concerns, it is quite possible that, during about 75% of the class time, there was at least one student dealing with substance. The system focusing on the teacher could therefore find the teacher substantively interacting for this 75% of the class time. This seemed to be the case, especially since it was found that a large portion of the teachers' interactions were with only one student, and since it was also found that students spent quite a bit of time awaiting.

The latter fact serves to introduce a short discussion of some of the things that the Data Bank teachers did not do so well in implementing the traditional teaching model. First, the teachers were not very efficient in organizing their classes. They spent about a fifth of their time managing the students and the environment. The organizational patterns they used resulted in students' spending 35.4% of their class time waiting to begin or continue activities, and only 36.8% of their time actually involved in movement activity. About a fourth of the movement activity did not deal with substantive concerns. The general class organization may have also caused the teachers to move around too much while the students were working. Almost 20% of the pedagogical cycles initiated by the teachers consisted of only a solicitation move, leading to the conclusion related in Chapter Six that the teachers moved about soliciting student behavior but not staying long enough in the vicinity to watch the students respond.

Second, most of the feedback provided by the teachers did not refer to specific parts or qualities of the motor performances, and therefore may have been of limited corrective value to the students.

Finally, the teachers evidenced very few sympathetic or empathetic behaviors. This may have been due in part to the fact that most student reactions were neither positive nor negative, but perhaps the teachers could have done more to encourage students to express their feelings.

The Patterns of Variability

The third general theme to emerge from an overall review of the data presented in the preceding chapters deals with the patterns of

variability of the behaviors of the teachers and the students in the Data Bank sample.

The first and probably most expected pattern is one of wide variability. Such variability occurred from class to class in the frequencies and durations of the functions and pedagogical moves of teachers and students. This wide variability must be kept in mind when considering the generalizations offered so far in this chapter.

A second pattern is one of very little variability. This lack of variability is evident when considering the *average* frequencies and durations of the behaviors of *categories* of teachers and students. Surprisingly, the overall behaviors of teachers and students at the secondary level were very similar to those of teachers and students at the elementary level. The elementary school teachers, though, did spend less time administering, did give more feedback, did react positively more often and did use less individual and small group class structure than the secondary school teachers. In addition, students at the elementary level had more drills and directed activities, played fewer games, and used more structuring moves than those at the secondary level. Only slight differences were found, also, in the behaviors of male versus female teachers or students. Among the teachers, these included slight sex differences in the amount of nonverbal directions given, and in the ratio of acceptance/praise to direction/criticism. The slight sex differences among students involved time spent in movement, awaiting, receiving information, and practicing.

Other types of variability include those listed below.

1. Students who engaged in dual sports received more feedback than those who engaged in team sports.
2. Students in small classes spent more time awaiting and less time practicing than those in large classes.
3. Teachers who were more experienced, or who had smaller classes, gave more feedback than those who were less experienced or had larger classes.
4. Teachers gave more demonstrations with feedback when they were skilled in an activity than when they were not as skilled.

So Where Do We Go From Here?

At this point you may be thinking, "So things occurred at a rapid pace in the classes of the Data Bank sample; the teachers seemed to be fairly traditional and did some things well and some not so well; there was a lot of variation from class to class, but not so much between the elementary school and secondary school levels or between males and females; and there were a few other variations. But so what? What does it really mean? Where do we go from here?"

In regard to descriptive analytic research itself, interested physical educators should move in four related directions. First, we must attempt to develop an underlying structure of all that occurs in physical

education classes. Such a structure would define all the aspects of what occurs, would delineate the relationships among those aspects, and would certainly facilitate future reviews of studies such as those reported in this monograph.

Second, we should study this newly developed underlying structure, determine what important parts of it we cannot yet systematically describe, and work to develop the lacking descriptive analytic systems.

Third, we should encourage interested persons, perhaps graduate students, to apply the newly developed systems to the Data Bank videotapes. This endeavor would enable us to complete the description of the classes in the Data Bank sample.

Fourth, we should encourage the application of our presently and newly developed descriptive systems to other samples of physical education classes. Such an effort would increase the representativeness of our descriptive data, and allow us to draw much stronger and more generalizable conclusions.

We must also go somewhere else from here, somewhere with the findings presented in this monograph. These findings should be more than a body of interesting facts. They should, first of all, become the building blocks of a collection of normative data, a collection that will be increased if the first four suggestions above are followed. Such normative data would allow physical education teachers to compare the behaviors in their classes with a valid and reliable norm, and perhaps to find some support for some things they are doing at or above the norm levels. Normative data will also help those of us in teacher preparation to better prepare teachers for what they will find in the real world of elementary and secondary school physical education.

There is a danger inherent, though, in providing a collection of normative data. The danger is that the norm will be considered a model of what *should* occur in physical education classes. We must therefore begin to study the "goodness" or "badness" of the normative behaviors. Then we could promote the "good" behaviors as part of a model of good teaching, and we could tell the educational world what a good job we are doing in certain respects. We could also begin to bring about change in regard to the not so good normative behaviors.

The wealth of information presented in this monograph will serve as a starting point for the development of a model of good teaching in physical education. This, then, is not merely the end of another book it is really just the beginning.